NATURE MAGAZINE

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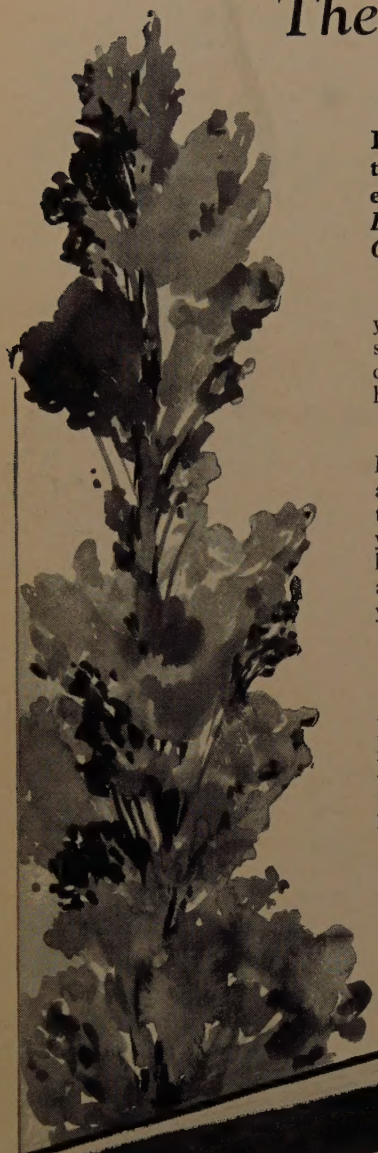
JANUARY 1934 U OF I 35¢ VOL. 23. NO. 1

A Christmas Gift of Lasting Interest

The POCKET NATURE LIBRARY



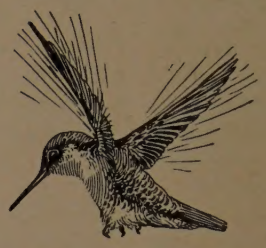
If you like to give presents that are not limited to any season but are used and appreciated every day of the year—*add the Pocket Nature Library to the list of gifts you will give this Christmas.*

Nature takes no vacation. For 365 days in the year her miracles are constantly unfolding but—sometimes she is very reluctant to display her charms except to those who know just where and how to find them.

Owners of the beautiful POCKET NATURE LIBRARY are always able to recognize and fully appreciate the bounteous gifts of Nature wherever they may be. To carry these convenient books with you on all your walks or simply to keep them at home for reference means that you too need never again miss the inspiring wonders that lie all about you and which are yours for the asking.

END CHRISTMAS WORRIES

To solve your gift problems this year in a way that will be thoroughly appreciated, make this a Nature Book Christmas by giving a set of the POCKET NATURE LIBRARY to the children and to any and all adults—it is the answer to the perplexing question, "What shall I give?"



Contents of the Four-Volume

POCKET NATURE LIBRARY

1. THE BIRD GUIDE

236 pages—192 color plates. Giving the description of 303 birds with their songs, nests and range.

2. TREE GUIDE

265 pages—211 halftone illustrations. 32 illustrations in full color. Describing 557 trees together with region where found.

3. FLOWER GUIDE

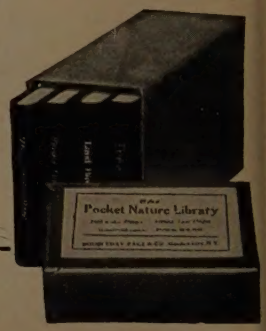
228 pages—320 color illustrations. 561 flowering plants described, giving characteristics and habitat of each.

4. BUTTERFLY GUIDE.

237 pages—295 color illustrations. Representing 225 species and varieties.

The full set of four volumes contains 700 color plates, many black and white illustrations and 1,000 pages.

MAY we suggest that you order a set to be sent on approval for one week and then order as many sets as you will need for Christmas gifts. For each set ordered you need pay only $1.98 as first payment and $2.00 a month for two months. If you order at least three sets and prefer to pay cash for them you may deduct twenty-five cents a set, saving seventy-five cents.



NATURE BOOK DISTRIBUTORS

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Send me a set of the POCKET NATURE LIBRARY. I will either return the set to you within one week after I receive it or I will send you $1.98 immediately and $2.00 a month for two months (total price $5.98).

Send me..... sets (at least three) at the special price of $5.73 each.

☐ remittance enclosed ☐ send C.O.D.

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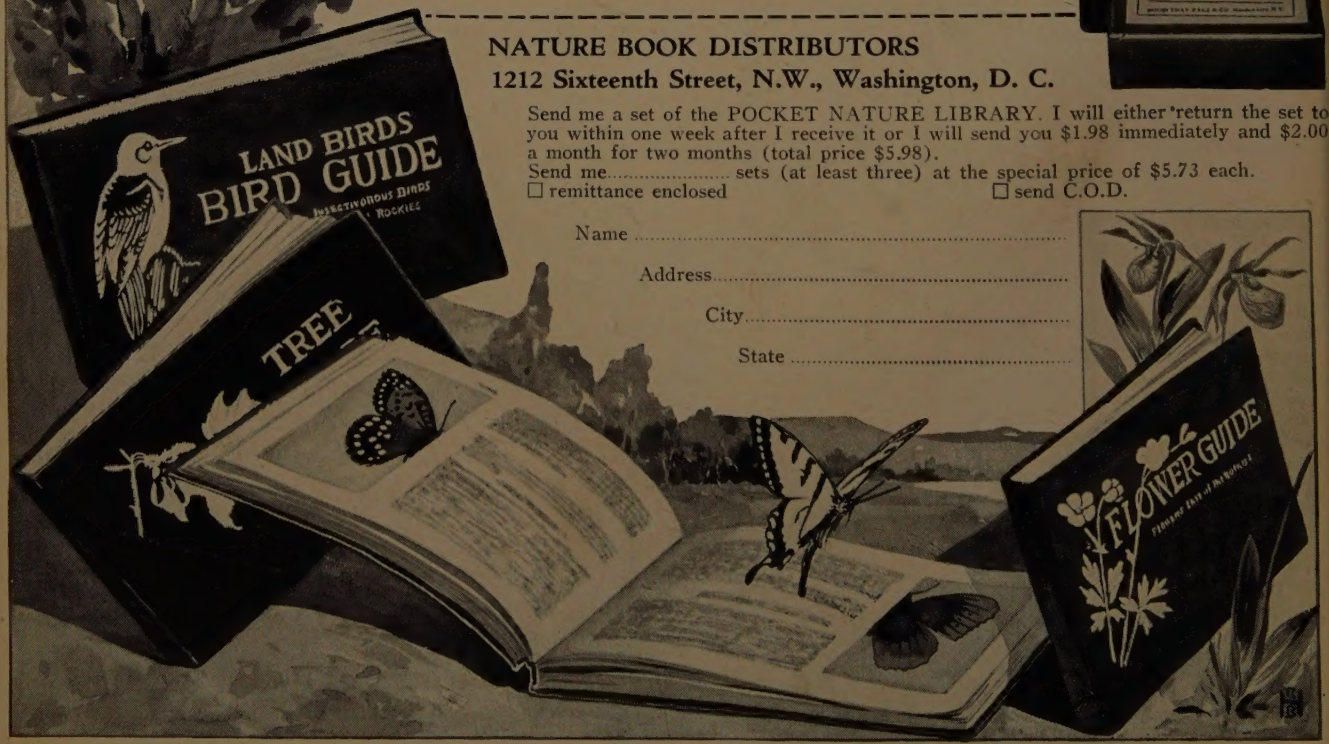


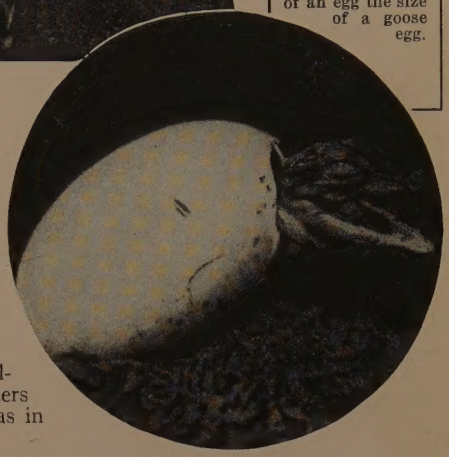
The Greatest Zoo on Earth!

4,000 Strange and Marvelous Sights!

A pageant of wonder, beauty, and thrills awaits you in this new and epoch-making work, "Wonders of Animal Life." Here is a greater "zoo" than you ever imagined. All kinds of creatures appear before you in nearly 4,000 pictures—many in brilliant colors—great and small, gentle and ferocious, monstrous and microscopic! Here are the *real* wonders of nature revealed to you by the greatest naturalists, adventurers, photographers, and writers—here is gorgeous entertainment and fascinating education combined!

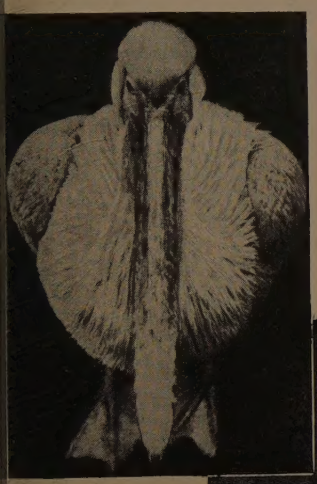
A Man-Eater takes a magnificent, flashlight portrait of himself by tripping over the photographer's carefully concealed wire.

This Crocodile may grow to be eighteen feet long, but it hatches out of an egg the size of a goose egg.



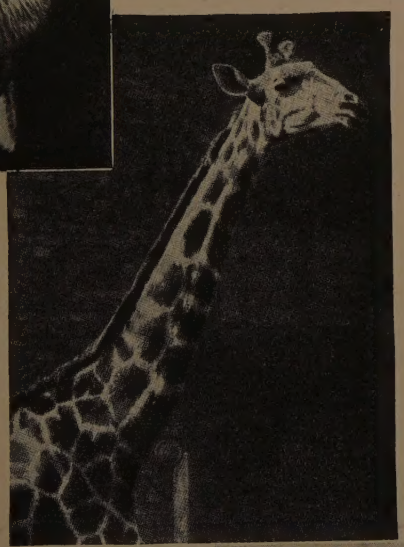
"Wonders of Animal Life" is an encyclopedia of marvels. It transports you to jungle, forest, river, mountainside and shows you the queer and wonderful and mysterious things that nature has created. You explore the whole animal kingdom, birds and beasts, reptiles and fish. You learn in what a strange variety of ways and places the incredible infants of the animal world come into being. You follow these infants from birth to maturity and observe the amazing changes through which they develop. You learn of their family life, their amazing resourcefulness in building and construction which frequently excels man's own ingenuity! You see them pursue their wild, adventurous careers, witness their violent deaths.

Prepare to be thrilled—for no such sights have been assembled before. No such pictures have ever been collected. No such thrilling tales of first-hand encounters with the wild life of the world have ever been told, as in



WONDERS of ANIMAL LIFE

4,000 PICTURES—4 BEAUTIFUL VOLUMES



READ These Amazing Chapters

When Night Falls in the Jungle • Playtime Among the Birds and Beasts • How Animals Express their Feelings • Insects that Fight for Man • Nature's Miners and Tunnelers • Pygmy Trappers • What Comes Out of an Egg • Weapons and Warfare

and 155 other chapters equally fascinating in "Wonders of Animal Life." Every word true—every story a thriller! Pictures on every page—4,000 in all! 33 gorgeous plates in full color. A work for the whole family to enjoy—its entertainment never grows old!

What creatures carry their eyes on periscopes and hoist them into the air for a better view?

What "dragons" are alive today?

What birds—and what beasts—specialize in snake killing?

What killers administer anaesthetics before dispatching a victim?

What are the "wolves" of the sea—hunting in packs?

What large, four-footed animal spits in your face to express his dislike?

Which creatures wear their skeletons outside?

Which animals are masons and builders on land and sea?

These—and ten thousand other questions are answered in WONDERS OF ANIMAL LIFE.

Save Nearly 50% of the Regular Price

This sumptuous four-volume work sells regularly for $22.00. While our supply lasts, you can have this set for only $11.70—in easy monthly payments.

Examine It On Approval — Mail This Coupon

WM. H. WISE & CO., *Publishers*, Dept. 71
50 West 47th St., New York, N. Y.

Reserve for me one set of "Wonders of Animal Life" complete in 4 royal octavo volumes. Notify me when the books are ready to ship, and I will send $1 as a deposit. Ship me the books on approval. If I return them after a week's examination, my $1 deposit is to be refunded. If I keep them, you will accept it as a first payment and I will send you $2 per month until the total of only $11.70 (plus carriage charges) has been paid.

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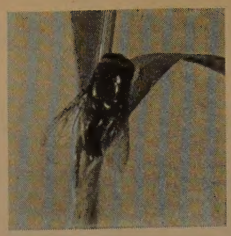

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DIRECT ENLARGING

BY MARK HACKER

How many owners of hand cameras equipped with Tessar lenses and double extension bellows are aware of the enlarging possibilities of their equipment? I was totally ignorant of such possibilities until recently when, cleaning my camera and lens, I discovered, by accident, that the rear component of the Tessar forms a clear image.

The manufacturers state in their catalog on lenses that in computation of their Tessars no attempt has been made to render either component, front or rear, separately available as an independent system. True, the front component of the Tessar, having a negative focal length, cannot form a real image. But the rear element does form a clear image and therefore can be utilized independently. Having a very short focal length, it is especially adaptable for the photographing of small objects at close range, which actually is direct enlarging.

Most of the cameras equipped with double extension bellows, have bellows capacity of just about twice the focal length of the lens equipment, i.e. if a camera is equipped with a lens, say, of 4½ inches focal length, the bellows capacity would be 9 inches. Thus with a Tessar doublet, and bellows capacity of twice the focal length of the Tessar, photographs of objects in actual size can be made but no enlarged image is possible, due to limited bellows capacity.

Supplementary lenses for shortening the focal length of the Tessar are available, but the reduction gained may be at best twenty percent or less. With this combination, photographing at a little closer range becomes possible and a slightly enlarged image will be the result. But, with the rear component of the Tessar having a considerable shorter focal length than the Tessar supplementary combination, photographing at comparatively closer range results in a considerably larger image.

For instance, take a popular size camera of 3¼ by 4¼ inches equipped with a Tessar of 5¼ inches focal length, and bellows capacity of 10½ inches. With a supplementary lens combination, the focal length may be reduced from 5¼ inches to 4¼ inches. Employing the full capacity of bellows of 10½ inches, an enlarged image of about 1.4 diameters will result. Now the rear component of the 5¼-inch Tessar has a focal length of about 3⅛ inches, which actually makes the 10½ inch bellows more than triple extension (i.e. more than thrice the focal length of the lens), thus making an enlarged image of about 2.4 diameters possible.

It is evident that in Nature photography of small objects such as insects, the rear component of the Tessar can be utilized advantageously for making negatives for contact printing as well as projection printing. A projected print from the negative made with the rear component of the Tessar enlarged 3½ diameters, will result in an enlargement of about 8.4 diameters, whereas the negative made with a supplementary combination would require an enlargement of 6 diameters to equal the size of 8.4 diameters, resulting in objectionable graininess.

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The accompanying photographs of a common blue bottle fly illustrate the different size images obtained.

Fig. 1. Contact print from the negative made with a Tessar of 5¼ inches focal length and ten and one-half inches bellows extension. Result: Actual size image.

Fig. 2. Contact print from the negative made with Tessar supplementary combination of 4¼ inches focal length and 10½ inches bellows extension. Result: 1.4 diameters enlargement.

Fig. 3. Contact print from the negative made with a rear component of a 5¼-inch Tessar, focal length of the single element about 3⅛ inches and 10½ inches bellows extension. Result: About 2.4 diameters enlargement.

Fig. 4. Projection print from the same negative as the contact print shown in Fig. 2 enlarged 3½ diameters, resulting in an enlargement of about 4.9 diameters.

Fig. 5. Projection print from the same negative as contact print shown in Fig. 3 enlarged 3½ diameters, resulting in an image about 8.4 diameters.

When photographing at close range the depth of focus is very shallow and the lens diaphragm should be stopped down according to distance from lens to the object and the depth of the object to be photographed.

With bellows extended to twice the focal length of the Tessar the F values which are marked for the Tessar at infinity are reduced in square ratio to one quarter of the marked values and require 4 times the exposure as when focused for infinity under equal light condition. Thus F 16 becomes F 32; F 22 becomes F 44, and so on. Those values apply to the Tessar, Tessar supplementary combination as well as to the rear component of the Tessar; for when in each instance the distance from lens to the plane should be the same and also in each instance the same lens stop diaphragm should be used the light admission also remains the same.

Focusing may be done with bellows full extended by moving the camera closer to or further from the object until the image on the focusing screen appears in critical sharp focus. Precaution must be taken that the camera is not moved when changing from ground glass to plate holder or when pulling the slide as the slightest change in position of the camera will result in an out-of-focus blur.

Dominar lenses work on the principle similar to Tessars and of course the owners of Dominars can utilize the rear component of their lens as well as those of Tessars.

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The Editor of the Photographic Department would like to know from readers whether they like articles like the preceding or would suggest other photographic material.

Have you any Wild Flowers in Your Garden?

These wildlings of the woodland add an exotic charm to the shaded corner or the spot you had not known how to treat.

But

to grow wild flowers you must know their needs of soil and care. Many of our rarer wild flowers have become so because they have not been gathered with care. Seeds of many are now available, and you may wish to save a clump of some kind threatened by the steam shovel, the road builder, or the woodsman.

If

you do you should know your wild flowers. You will find this knowledge in text and in many pictures in

Pioneering with Wild Flowers

an attractively written, fully-illustrated book based on a lifetime of study and experience raising wild flowers.

SEND
TWO DOLLARS
TO

BOOK DEPARTMENT
AMERICAN NATURE ASSOCIATION
1214 16th St., Washington, D.C.

Handkerchief Maps

Completion of the George Washington Memorial Parkway along the banks of the Potomac River is devoutly to be desired as a national memorial. While the section from Mount Vernon to Washington is now finished, the project calls for extension as far as Great Falls on the Maryland side. Congressional authorization is contingent upon State and local funds being used to purchase areas within the proposed Parkway. Economic conditions have held this up but the American Civic Association has devised a novel means of raising funds to purchase certain key properties. A handkerchief map in color, measuring about twenty-eight inches square, reproducing the original L'Enfant plan for the Federal City has been made. There is a border of sketches of notable buildings in the Capital. The map is printed in any one of six colors on a fine quality of muslin, sunfast and washable. They are susceptible of various uses beside that ordinarily vouchsafed a handkerchief—framing, card table trays, scarfs, draperies, bed spreads and whatever the individual ingenuity may devise. These maps sell for one dollar, the proceeds going to the Parkway, and they may be ordered from the American Civic Association, 901 Union Trust Building, Washington, D. C.

Finley Lectures

Choosing the alliterative title of "Birds, Bergs and Kodiak Bears" as the title of one of his 1933-34 lectures, William L. Finley will bring his famous wild life motion pictures east again this winter on his annual tour. His lectures and the splendid pictures are of particular interest to the readers of NATURE MAGAZINE since some of the experiences connected with obtaining the films have been told in the magazine by Arthur Newton Pack, President of the American Nature Association. In addition to the aforementioned lecture, Mr. Finley also has available his films and lecture entitled "Camera Hunting on the Continental Divide" and "Getting Personal with Mountain Lions". The first presents the spectacular mountain goat pictures, some of which were taken by Mr. Finley while himself disguised as a mountain goat, and the second tells the story of a thrilling camera hunt of a mountain lion in the southwest. In this last film Mr. Finley took pictures from a tree top with the treed lion in the next tree within easy jumping distance. All three of these lectures testify to the fearless work of the wild life photographer who is noted for thinking of the picture first and danger afterward. Those interested in obtaining Mr. Finley for lectures where available dates are still open on his schedule may obtain full details by addressing William L. Finley, Route 10, Portland, Oregon.

Dakota Wild Flowers

An excellent bulletin entitled *Wild Flowers of North Dakota* has just been brought out by the Agricultural Experiment Station of the North Dakota Agricultural College at Fargo. It is the work of O. A. Stevens and does excellent justice to the many wild flowers of the State. The booklet is well illustrated. We imagine that it is available free to citizens of the State.

Santa Fe

It will be

a long time before you can again plan a California winter at such *low cost*. Consider that—

¶ The Santa Fe has cut its rail fares, between all points west of Chicago, from *16-2/3%* to as much as *44-2/5%*.

¶ The Santa Fe has eliminated the surcharge in Pullmans—reducing Pullman cost *33-1/3%*.

¶ Living costs in California and Arizona are *still* extremely low.

Consult your Santa Fe agent. He can show you startling savings in your trip budget—more than enough to pay for some famous Santa Fe side-trip over the **Indian detour,** or to **Grand Canyon;** or for extra play days at destination.

California

and **southern Arizona**—sunny, alluring, infinitely varied—are the perfect winter playgrounds. *Fine* Santa Fe daily trains serve both.

Tri-weekly thru Phoenix Pullman, again this winter, on THE CHIEF. Daily Phoenix and Grand Canyon Pullmans on the Grand Canyon Limited. *And always, on the Santa Fe, that famous FRED HARVEY dining service.*

Ask for picture folders.

Mail this

Santa Fe

W. J. BLACK, P.T.M., Santa Fe Sys. Lines
1212 Railway Exchange, Chicago, Illinois
Send Picture Folders and new low Santa Fe fares from_____ to_____
Name_____
Address_____

SUMMER CAMPS • • •

During the Christmas holidays, forward-looking parents begin to plan what their children will do during the summer holidays. The summer camp deserves serious consideration. Nothing does more to build up a child physically, morally and spiritually than a summer spent outdoors at a well-supervised camp.

There are hundreds, even thousands, of summer camps for boys and girls. The majority of them are good camps. Not every good camp, however, is the best one to meet the needs of the individual child.

Some camps emphasize swimming, canoeing, Nature study, woodcraft and other outdoor activities that are not possible the rest of the year. Others feature baseball and athletics. Many specialize in horseback riding. A number offer excellent opportunities for music, dramatics and the handcrafts.

Some camps are progressive in their educational tendencies and allow the individual much option in his program. Others have a routine schedule.

Whatever the needs of your child, somewhere there is a camp to meet his needs.

A FREE SERVICE

Nature Magazine's Camp and School Service is conducted to help its readers solve their educational problems. We have visited hundreds of the better camps and schools and know much about those we have not seen. We are glad to give you the benefit of our knowledge without charge or obligation to you. A coupon is provided. If you wish to tell us more about your camp or school problems, write us in detail. All inquiries will be answered personally by Richard Deshon, Director Camp and School Service, Nature Magazine, 1214 16th St., N. W., Washington, D. C.

OUR FORTHCOMING CAMP DIRECTORY

Following are a few of the camps, announcements of which will be published during the coming months in Nature Magazine. The name and address of the camp is followed by the name and winter address of the camp director, who will be glad to send full information if you will mention Nature Magazine.

CAMP AND SCHOOL SERVICE BUREAU

Nature Magazine
1214 Sixteenth St.
Washington, D. C.

Please recommend:
Camp Rates ( ) $200 ( ) $250-300 ( ) $350 or over
Boarding School Rates ( ) $800-1,000 ( ) $1,000-1,200 ( ) $1,200 or over.

for my_____ age_____

who attends_____grade_____

at_____School. My religion is_____

Location preferred_____

Needs of child_____

_____

Remarks_____

_____

Name_____

Address_____

_____

CAMPS FOR BOYS

THE TOLTECS, Westport, Conn. Wallace Green Arnold, 424 East 57th St., New York, N. Y.

CAMP PASSACONAWAY, Harrison, Me. A. G. Carlson, Box 507, Scarsdale, N. Y.

CAMP PINNACLE, Lyme, N. H. Alvin D. Thayer, Lyme, N. H.

KAMP KAATERSKILL, Pownal, Vt. Herbert W. Lorenz, P.O. Box 424, Bennington, Vt.

THE FENIMORE RIDING CAMP FOR BOYS, Cooperstown, N. Y. Mr. and Mrs. Clifford A. Braider, 88 Chestnut St., Oneonta, N. Y.

MEENAHGA LODGE, Onchiota, N. Y. Kenneth O. Wilson, Onchiota, N. Y.

CAMP POCONO, Lakeville, Pa. Mr. and Mrs. C. G. Paxson, Windy Ridge Farm, R.D. 4, Norristown, Pa.

CAMP SUSQUEHANNA, New Milford, Pa. Robert T. Smith, 4 Point Circle, Malba, Whitestone P. O., L. I.

GREAT OAKS CAMP, Oxford, Me., Joseph F. Becker, 211 39th St., Union City, N. J.

CAMP KILLOOLEET, Hancock, Vt., Marie A. Taylor, 423 West 21st St., New York, N. Y.

CAMPS FOR GIRLS

CAMP KILLOOLEET, Hancock, Vt. Marie A. Taylor, 423 West 21st St., New York, N. Y.

MOSS LAKE CAMP, G. E. Longstaff, 8932 Clinton Ave., Jamaica, L. I.

CAMP WOODLAND, Londonderry, Vt. Mrs. Herbert W. Lorenz, P.O. Box 424, Bennington, Vt.

THE FENIMORE RIDING CAMP FOR GIRLS, Cooperstown, N. Y. Mr. and Mrs. Clifford A. Braider, 88 Chestnut St., Oneonta, N. Y.

MARS HILL CAMP, Union, Me., Beulah Frances Pack, 250 Forest Ave., Lakewood, N. J.

OGONTZ WHITE MOUNTAIN CAMP, Lisbon, N. H., Abby A. Sutherland, Ogontz School P. O., Pa.

CAMP WYNONA, Fairlee, Vt., Mr. and Mrs. A. B. Hall, Lakeville, Conn.

CAMPS

MOSS LAKE CAMP *"The Camp in the Wilderness"*
More horseback riding than is included in the fee of any other camp in the East. Private Lake and Preserve. No possible "extras." Hotel for Parents.
G. E. Longstaff, 8932 Clinton Ave., Jamaica, L. I.

KILLOOLEET Progressive methods applied to camping. Boys and girls, 5-10, live, work and play together in an unusual environment. Creative activity; all sports. Camping, nature, music and woodcraft. Green Mountains; private lake, bungalows.
Watkins 9-6176 Marie Antoinette Taylor
423 West 21st Street, New York City

CAMP PASSACONAWAY
Waterford, Maine. 26th Season
For boys 6 to 16 years of age. Four divisions; limited enrollment; private golf course; sailing; speed boat; mountain, canoe and fishing trips. Exceptional staff; excellent food and sound sanitation.
Mr. & Mrs. A. G. Carlson, Box 507N, Scarsdale, N. Y.

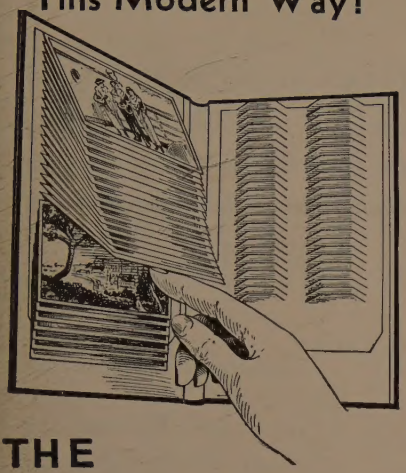
About Wild Flowers

As a boy George D. Aiken was as much interested in wild flowers as he was in the three R's in the little red school house. He set about learning the habits and soil preferences of these flower wildlings, and his first experiment was in moving a clump of Dutchman's breeches. Mr. Aiken has spent a lifetime with the wild flowers, growing and experimenting with them, and, finally, writing about them in a book which he entitles *Pioneering with Wildflowers*. Preservation of many of our wild flowers is an important matter. They have suffered from civilization and many that were once common are now listed as exceedingly rare. Besides spreading the word of preservation and urging that these flowers not be picked but be left that they may be enjoyed year after year, the establishment of wild flower gardens offers a means of preservation. This, however, is a proceeding that requires knowledge of the flowers and their soil requirements. In Mr. Aiken's book will be found the results of long experience in this field, and his volume is one which will appeal to all lovers of these flowers. The book is profusely illustrated. It sells for two dollars and may be ordered through the American Nature Association.

Northwest Nature Trails

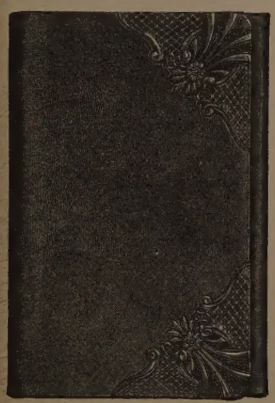
A little volume that will be of interest to all Nature students, and which will have special appeal to all throughout the Pacific Northwest, has just been issued by the Metropolitan Press, Portland, Oregon ($3.00), under the title of *Northwest Nature Trails: A Natural History of Oregon and Washington*, by Herbert Sheldon Lampman. The quality and scope of its subject matter furnish abundant evidence that the author has given an immense lot of toil and thought to its preparation, with the result that he has produced an unusually useful, lucid and pleasingly written presentation of many phases of Nature lore. In addition to a considerable number of well selected illustrations, the various subdivisions of the book include quite full discussion of such topics as paths of Nature; beasts of prey; beasts that flee; animals that gnaw; other mammals; song birds; game birds; marsh and sea birds; birds of prey; fishes and reptiles. There is also included a preliminary list of the mammals and birds of Oregon "as nearly complete as existing records permit." A study of this little book enables one to appreciate anew the comment of the author that "Truly the paths of Nature are many and lead to far places." J. S. W.

Mount Your Snapshots This Modern Way!



THE Fotofolio

is a most attractive new portfolio mounting many photos on the same page—all neatly arranged—no paste—no trouble—a few seconds do the trick. No more fuss and bother with old-fashioned albums. The Fotofolio is beautiful. It is a joy to look at. It is a delight to use. You'll be charmed with it. This illustration shows only one style—there are three styles, each in 2 sizes. You're sure to be pleased.



No. 2 size holds prints 2¼x3¼, 2½x4¼, 3¼x4¼
No. 3 size holds prints 2⅞x4⅞, 3¼x5½, 4x5, 1⅞x2½

No. 2 Size No. 7112 Price $1	Seal-grain Texaloid, Black, Brown, Green. Title in gold leaf	No. 3 Size No. 7113 Price $1.25
No. 7162 Price $2.	Alligator-grain leather — Black, brown. Gold title — Blank border lines.	No. 7163 Price $3.
No. 7382 Price $5.	Florentine-finish cowhide leather, embossed colored corners—Brown, Green, Red. Pocket for films and extra photos.	No. 7383 Price $6.

Select your size, number and color. You run no risk. Your money back if not satisfied—no red tape.

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I have return privilege if not satisfactory.

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National Tree Vote

With more than 100,000 votes already cast and tabulated, the National Life Conservation Society is continuing its vote for a National Tree until June 1, 1934. This extension of the closing date is in deference to the requests of many school teachers who have found the vote a splendid opportunity for the development of a tree and conservation project in their classes. Those teachers who have already conducted classroom polls and registered them in the national referendum have discovered an active interest on the part of their pupils, who have studied the merits of the various trees and cast their votes with notable thought and intelligence. Through this means the poll is increasing knowledge of trees and their value and appreciation of their beauty. At present the elm is the leading tree despite the serious threat to its future through the depredations of the Dutch elm disease. Votes may be registered with and additional information obtained from the National Life Conservation Society, 2239 Tiebout Avenue, New York City.

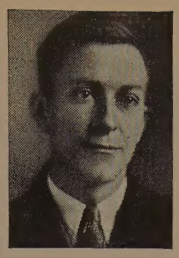
Tree Data Wanted

With $600,000 allotted for completion of the Mall in the National Capital, many trees planted on the site of the old National Botanic Garden are marked for destruction or removal. These trees were planted many years ago by distinguished Americans and foreigners. No formal record of these plantings was kept and George W. Hess, Director of the Garden, is seeking information that may shed some light on the origin of these historic trees. One of the trees was planted by the late Senator Omar Dwight Conger of Michigan, and his son, Frank B. Conger, 3220 Connecticut Avenue, Washington, D. C., is trying to get in touch with descendants of other tree planters. Have you a father or grandfather who planted a tree in the National Botanic Garden?

Our Wilderness Neighbors

Books descriptive of the habits of wild animals are always of great attractiveness to students because of the absorbing interest and genuine appeal of the subject. Tourists for many years have desired information regarding the natural history of the Yellowstone Park region. To meet the definite need of interpreting Nature to all such people is the purpose of the little volume *Our Wilderness Neighbors*, by Dorr G. Yeager. (Chicago, A. C. McClurg Company, $1.25.) After a general discussion of the region and its location, detailed consideration and illustrations are given concerning such topics as the American bison; bighorn mountain sheep; the elk; the mule deer; the moose; American prong antelope; various species of bears, particularly the grizzly; the lynx and the bobcat; the beaver, and the coyotes, the wolves and the foxes. The author has lived near these animals for many years and has learned to love them. It is extremely fitting that he write this exceptionally interesting book about his wilderness neighbors. It is brief yet quite complete, and by way of adding to the value of an already superior piece of workmanship the finest photographs available have been inserted. It also contains a brief but excellent bibliography.

J. S. W.



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PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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NATURE MAGAZINE is published monthly by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C. Additional entry at Greenwich, Conn.

Publication and Editorial Office, 1214 16th Street N. W., Washington, D. C. Additional Offices of Publication, Greenwich, Conn.

ONE YEAR $3
FOREIGN . . . $1 EXTRA
TWO YEARS $5
LIFE MEMBERSHIP $100

A. B. McClanahan, Advertising Manager

ADVERTISING OFFICES
New York—295 Madison Avenue
Washington, D. C.—1214 16th St.
Chicago—225 No. Michigan Ave.
Los Angeles—218 Haas Bldg.
San Francisco—Monadock Bldg.

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HAWKS AND HUNTERS

• • •

SOME PERTINENT THOUGHTS FROM AN INTERESTING CORRESPONDENCE

• • •

Not long ago one of our readers called our attention to the fact that an important southern newspaper was fostering a campaign which offered a reward for dead "blue darter" hawks. There have been many such campaigns, for the most part inspired by arms and ammunition manufacturers or by local dealers in such equipment. We wrote to the editor, sending with our letter a copy of *A Plea for Our Hawks.*

"It is well established," we said, "that few people can distinguish one species of hawk from another when it is on the wing. The number of beneficial hawks is considerably greater than those which may possibly do some damage. The diminishing numbers of our wild life can scarcely stand further diminution by such campaigns, which inevitably mean the killing of many hawks and perhaps other useful birds so that, through the process of elimination, a less desirable species may be entered in a contest for the rewards."

We received a splendid reply from the editor. He expressed himself as entirely in sympathy with our view. He declared himself distinctly dubious about the wisdom of offering a bounty for any hawk or other form of wild life. But, he said, there has been an undeniable increase and a definite over-population of blue darters. There have been many authentic observations of onslaughts on quail and other common birds. The editor also expressed the opinion that, in view of the present extreme poverty of the farm population, few shells will be wasted on the wrong hawks.

In addition, the editor writes, "this campaign has given me the opportunity to focus attention on other matters that need attention as well: the killing of migratory waterfowl, regardless of season, by weekend city 'sportsmen'; the need for non-political game wardens; the cultivation of sentiment for protection of songbirds in our schools. And I am far more seriously concerned over the constant warfare on our few pileated woodpeckers than on the protection of either quail or hawks."

Now the name "blue darter" is generally applied both to the sharp-shinned hawk and Cooper's hawk. These three are the black sheep of the Hawk family. In a state of proper natural balance they do not merit extermination. When there is an un-natural over-abundance of predatory species some degree of control may well be necessary. Assuming such a situation to exist in the instance which was the subject of our correspondence, we will not quarrel with the editor's support of the campaign. We must, however, express the hope that those taking part be strongly urged to use care and discrimination in thus reducing the number of the predatory species.

This hawk question, important as it is because there have been so many instances of abuse, is not the most important feature of our recent correspondence. The really significant point is made when the editor writes:

"During the twenty years that I have lived in this vicinity I have worked for the protection of almost every kind of wild life. Some progress has been made, but it has been discouragingly slow until the last year or so. Most discouraging of all has been the fact that those who should be most interested have been the stumbling blocks. State and federal authorities have interested themselves hardly at all. Judges have denounced the game laws and refused to impose sentences under them. A college professor is one of the most indiscriminate killers under the guise of sport.

"The most hopeful and cooperative movement for wild life protection is fostered by a few intelligent hunters, who, for one reason or another, happen to be capable of leadership. Can you blame me, if I occasionally make a concession to their views, even though with some misgivings?"

Blame? Certainly not. Rather would we applaud and wish that there were more—many more—communities fortunate enough to boast an editor of such vision. And we might also wish that there were more "intelligent hunters" equipped with qualities of leadership and unselfish appreciation of conditions, and able really to accomplish something for the protection and increase of our wild life resources. Through such a collaboration something might be done about the judges who refuse to respect the game laws, the citizens who kill without reason under the disguise of sportsmen and the indifference of enforcing authorities—an indifference born of inferior mental capacity or political pressure.

This being the day of new deals, it is about time we had one for our wild life. In this game, killers have been dealing off the bottom of a marked pack of cards long enough.

WHEN WINTER SNOWS COVER THE GROUND THESE BOB WHITE QUAIL AND MANY OTHER BIRDS NEED HUMAN AID TO SURVIVE. FEED THE WINTER BIRDS

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NATURE MAGAZINE

VOLUME 23 JANUARY · 1934 NUMBER 1

ON THE WINGS OF THE NORTH WIND

BY E. CHESLEY ALLEN

ILLUSTRATED BY R. BRUCE HORSFALL

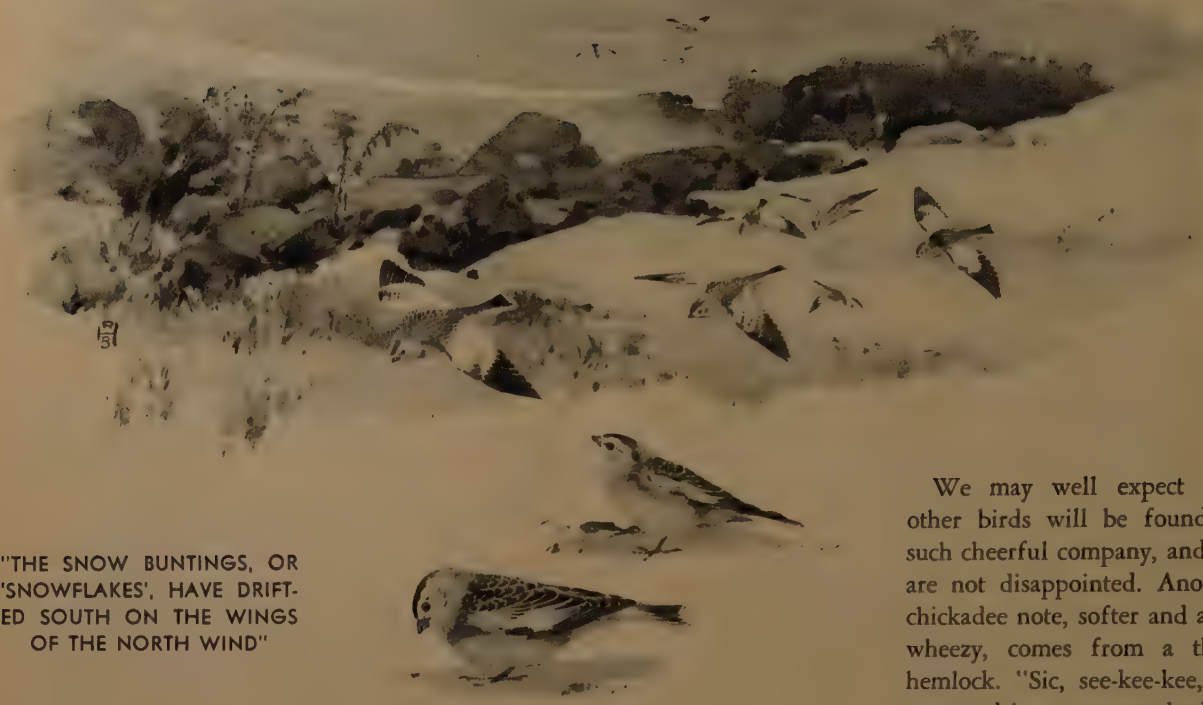
Last night we had a fall of snow; soft feathery flakes that came down out of the breathless, black dome in a zigzag, hesitating manner, as if reluctant to leave the upper regions of the air; and, clinging to each other in this strange lower world of ours, smoothed and softened every rough surface by curves of purest white, and enlarged even the smallest twigs to enormous sizes. Toward morning the air chilled; the snow-clouds sullenly withdrew in leaden gray masses; and now the rising early January sun is transforming into living diamonds a sprinkling of frost crystals still falling from a hard blue sky. The brittle air is full of winter's crisp and crackling voice.

Across the street is a row of rowan trees. Their gray-green trunks stand out in relief against a sloping background of blue-white; while up among their network of smaller branches and sharply-pointed black buds are drooping clusters of coral-red berries, each cluster surmounted by a perfect cone of snow. For some mysterious reason the robins in their southward migration last autumn had failed to take their usual toll of rowan berries.

As I stand entranced by this beauty, a subdued chorus of whistled notes comes down out of the sparkling blue; and, with a soft whirring of wings, a score of grayish birds settles upon the rowans, shattering the fleecy architecture, and sending its fragments to the smooth white beneath. Somewhere, away in the far north, the pine grosbeaks had felt the urge to move southward. Probably no scarcity of food in that illimitable area of forest with its abundance of frozen berries and tender buds, but an age-long, mysterious whisper to migrate had launched these hardy voyagers upon the wings of the north wind.

Immediately upon alighting, but with slow, parrot-like motions, they attack the clusters of red berries, carefully extracting the hard seeds, and dropping the soft red pulp like drops of blood upon the snow beneath. Reared in the wild, they have not learned the treachery of human beings, and allow a close inspection. They are slightly smaller than robins, have distinctly notched tails and remarkably short stout beaks, hence the name, grosbeaks. The general color is a soft, dark gray, with two white wing-bars, and the shorter wing feathers are also edged with white. Four or five of the flock, however, immediately attract my attention by a suffusion of deep rosy red over their plumage, brightest on head, breast and rump. These are the older males. On the remainder of the flock, females and young males, the red is replaced by yellowish olive. Presently

"IT IS A RARE TREAT, INDEED, TO HEAR THE SONG OF THE PINE GROSBEAK IN WINTER"



"THE SNOW BUNTINGS, OR 'SNOWFLAKES', HAVE DRIFTED SOUTH ON THE WINGS OF THE NORTH WIND"

one of the rose-washed males ceases his feeding, hops deliberately to the topmost twig of his particular rowan, and sends forth upon the crisp, sparkling air a song of melodious beauty, reminding me of the song of the purple finch, but, unfortunately, much shorter. It is a rare treat, indeed, to hear the song of the pine grosbeak in winter.

Let us fare forth on some crisp January morning. The snow creaks under our feet; and, as we cross a little brook that falls step by step down a rocky ledge, we stop to admire the fantastic form of the congealed water caught in its fall by the frost, and to listen to the muffled music of the water still flowing under the ice.

As if in answer to the brook's sweet undertone a chorus of low gurgling notes comes from a nearby thicket. We stand perfectly still, and are soon in the midst of a flock of black-capped chickadees. They are moving through the woods, flitting from bush to bush, and examining with most minute care fragments of clinging leaf and scraps of loose bark where insect eggs or pupæ may be found. Evidently they are well satisfied with their fare, for their feeding is interspersed with a running comment of chirps and gurgles, the merriest avian conversation to be found in the north woods. A discreet "cheeping" from our pursed lips brings one of the chickadees suddenly to within a yard of our faces, and we can see every detail of jet black cap and throat, pure white cheeks, beady black eyes, and soft gray body with a wash of buff on sides and flanks. He eyes us intently, turning first one eye and then the other upon us, decides that we are harmlessly stupid, and with a final, impudent "Chick, chee-dee-dee", flits off to another shrub, and continues his persistent search for insect fare that lurks there.

We may well expect that other birds will be found in such cheerful company, and we are not disappointed. Another chickadee note, softer and a bit wheezy, comes from a thick hemlock. "Sic, see-kee-kee," it says, and in a moment the bird comes around to our side of the tree, and we see the northern relative of the black-cap, the Acadian chickadee. He is quite easily recognized by his cap, which is mouse-brown instead of black, and by the wash of cinnamon-brown upon his sides. Others of his kind soon appear, and we find that the roving flock is pretty evenly divided between the two species. A few Acadian chickadees remain to breed in our Maritime Provinces, but when spring comes the greater number will drift off to more northern ranges.

A needle-fine, long-drawn "Seep" calls our attention to a tiny, olive-green bird flitting about the top of a spruce. He is working, half-hidden amid the deep green, and most of the time is quite concealed; but, by patiently waiting, we finally get a good view of him, tiniest of all our winter birds, the golden-crowned kinglet. When he comes into full view for a moment we see a diminutive being in olive-green feathers, showing two white wing-bars, and a crown patch of brilliant orange-yellow bordered by lines of jet black. Like the Acadian chickadee he and his kind have come down to us only for the winter, preferring to nest in more northern latitudes. But a few will remain to rear their young in our provinces, and, to him whose ears are closely attuned to bird voices, their simple song resembles the opening, or prelude only, of that marvellous song of the ruby-crowned kinglet, and is a simple repetition of a single note, increasing in rapidity, but stopping with disappointing suddenness just when one expects it to go on into the marvellous outburst of the ruby-crown.

Steadily this little flock of chickadees and kinglets works past our station with many a low gurgle and fine cheery cheep; and, just as we feel that the last bit of bird

life has disappeared, we hear, from the trunk of a dead birch, the "rap, tap, tap" of a woodpecker. Probably only a hairy or a downy woodpecker, both common to our winter woods. But, as the author of the tapping works around to our side of the tree, we are startled to see a bird with an entirely black back, and lacking the broad white stripe so conspicuous in our two common species. We notice that the wings, too, are almost entirely black, and the sides are barred with black and white. But, most remarkable of all, as the bird drops to a low position on the trunk, we catch a glimpse of a crown patch of pure golden yellow, a flagrant exception to the rule of red crown patches upon our male woodpeckers. We are most fortunate in this opportunity to see one of our rarer woodpeckers, the Arctic three-toed woodpecker. We are to be favored still further; for presently the female appears and alights upon the same tree. She is colored like her mate except that she lacks the crown of golden yellow. These dark-cloaked woodpeckers from the north come south to spend only their winters in our more mellow atmosphere, though an occasional pair, quite possibly from farther south, will remain to rear a family amid the more remote depths of our forests.

"ONE OF OUR RARER WOODPECKERS, THE ARCTIC THREE-TOED WOODPECKER. . . . AND PRESENTLY THE FEMALE APPEARS AND ALIGHTS UPON THE SAME TREE"

We leave the thicket and emerge into a cleared field where the wind has blown the snow from the little rolling swells of land and partially exposed patches of stubble. A chorus of low, soft chippering notes calls our attention to a certain part of the field, and, when we turn our heads, the brown and white ground in that part seems to be strangely alive with small patches of the same mottled colouring. We look closer, and discern a large flock of sparrow-like birds running low over the ground, and searching everywhere for last autumn's scattering of seeds. They are mostly white, with irregular mottlings of black and brown perfectly blending into the brown and white landscape. The snow-buntings, or "snowflakes", have drifted south on the wings of the north wind and find in our sparsely snow-covered land ample sources of food supply. As we approach they rise as if on a given signal, wheel about gracefully with a chorus of sweet warbling notes, and settle again upon a more remote part of the field.

The field is bordered on one side by a low stone wall; and rising above the snow that has drifted against it are the dried stalks of fireweed, golden-rod and aster. Most of the seeds drifted away upon the winds of autumn; but here and there is a stalk where, for some reason, the seeds have persisted. From among the dried stalks comes a canary-like "whee-ee", long-drawn and with a rising inflection, and we soon see, working among the remaining brown seed clusters, a small flock of olive-green birds, smaller than sparrows and with distinctly notched tails. The wings and tail are dark, almost black; and a decided tinge of yellow is evident upon their shoulders and rumps. They are carrying on a cheery, chirping conversation, interspersed occasionally with that rising canary-like note. Here are our goldfinches in their winter costumes, a contrast with the brilliant coat of summer.

A few minutes later, when they rise and disappear over the edge of the woods, with that peculiar undulating flight accompanied by a "per-chic-o-ree" note, our minds go back to the early summer, when we saw them in striking garb of bright lemon-yellow and jet black, rifling the heads of newly-seeded dandelions. But it is

"JUST OUTSIDE THE ROCKS SWIMS A SMALL BIRD, ABOUT THE SIZE OF A MONTH-OLD CHICK. . . . IT IS THE DOVEKIE, OR 'PINE-KNOT', AS IT IS CALLED BY THE SHORE FISHERMEN"

quite probable that our goldfinches of last summer are wintering farther south, and that these of the winter fields have come down to us from farther north.

Crossing the field we take an old wood road leading to the shore. As we enter the road a Canada jay drifts across our path in silent sailing flight.

Where we come upon the shore is a rocky cove where a succession of long swells is alternately advancing and receding between the brown weed-covered rocks. Just outside the rocks swims a small bird, about the size of a month-old chick, dead black above, and white below. Its small size and short conical bill immediately identify it as a dovekie, or "pine-knot" as it is locally known by our shore fishermen. We stand motionless, for here is an opportunity to watch the feeding habits of this little seabird of the far north. He eyes us continuously for a minute, and then, apparently satisfied that we mean no harm, dives headlong; and, swimming under water, comes in with an advancing swell. We catch glimpses of his little dark form quickly turning this way and that beneath the surface, and then lose him as he goes out with the receding wave. In a moment up he comes to the surface, rises almost perpendicularly, and flaps his small, pointed pinions. How small they seem; and yet we know that they can drive that little plump body with incredible swiftness into the very teeth of raging winter gales. He drifts for a short distance along the shore, then dives, to come in on another little foraging expedition beneath the next wave. It is interesting that his method of feeding is just the reverse of the action of the sanderlings which, last autumn, we saw feeding along this same shore, running out in the wake of each receding wave, and retreating up the beach ahead of each advance.

Farther off-shore a trio of old-squaws, or "cockawees" is riding gracefully, the long-tailed drake in his spectacular plumage of white and dark brown, and two females in more modest apparel; and still farther out a more wary flock of golden-eyes, or "whistlers", swimming above a rocky ledge, and submerging for incredibly long periods in their search for mussels and small crustaceans that dwell upon the rocky bottom.

These all, and many others of woodland, field, and sea, will later follow northward the clanging squadrons of the wild geese; will rear their broods in dark sub-arctic forests, among the lakes and rocks on many a long rolling barren, or along the shelves of jagged ocean cliffs; and, when again the wheeling sun sweeps lower in his daily journey, and the mysterious voice of the northland whispers, they will drift south to us on the wings of the north wind.

• • •

In the February issue of Nature Magazine we are going to take our readers to the southwest where those who live in northern climates can get a bit of warm sunshine by proxy. It is not a southwestern number and it is not entirely devoted to that region. It will, however, contain an article on the birds of the southwest by Florence Merriam Bailey and one on the mammals of the region by Vernon Bailey. There will be a third southwestern article devoted to the plants of the desert country

BOTANIZING IN WINTER

THE FERN LOVER MAY FIND MUCH IN THE WOODS IN THE FRIGID SEASON

BY LOUISE F. A. TANGER

PHOTOGRAPHS BY LEONARD HARNER

WINTER botanizing may sound a bit odd but it is entirely practical in many places. In fact, for some of our native ferns it is the best botanizing season. The delicate loveliness of many ferns is sturdy enough to withstand the coldest weather and these species stand out on winter days more conspicuously than when summer surrounds them with a maze of greenery. Frost levels them to the ground but does not mar their beauty.

A hillside covered with rank growth of Christmas fern, *Polystichum acrostichoides*, the marginal shield fern, *Dryopteris marginalis*, and the common wood fern, *Dryopteris intermedia,* promises an afternoon packed with thrills to the fern lover. These are all common species. Let no one seek new worlds to conquer after merely identifying specimens of each of them, because their variations are amazing. That is one of the things that makes ferns so fascinating. Named forms lure the fern hunter with their intriguing differences. Blustery days of biting cold are more endurable on such hillsides where the sheltering rocks are green with the rock cap, or common polypody, *Polypodium virginianum,* and where one is screened from the wind by pine and hemlock and by thickets of rhododendron and laurel.

On milder days one may essay exposed cliffs of mica-gneiss for such rarities as Bradley's spleenwort, *Asplenium bradleyi.* Also for the less rare pinnatifid spleenwort, *Asplenium pinnatifidum*, which, however, is scarce enough to make the finding of it a red-letter day. Another cliff dweller is the finely cut but leathery little mountain spleenwort, *Asplenium montanum,* of our eastern states.

DRYOPTERIS MARGINALIS X CRISTATA
An attractive fern which is found in swampy woodlands and worthy of the searching

On crisp winter days one is eager to explore great rock masses for treasures such as these. During the hot, humid summer days one often lacks the energy. Visibility is hampered in the growing season by festoons of vines and interlacing leafy branches, progress is impeded by the rank growth of weeds, while hordes of mosquitos, flies and "ticks" make life miserable. It is hard to locate even the massive ledges themselves, sheltered as they are by the protecting greenery. In winter they stand out in all their rugged majesty and one's spirit leaps to their challenge.

Leaving the mica-gneiss rocks with their acid soil reactions and turning to limestone cliffs, still other treasures may be discovered. Nothing could be lovelier than the exquisite rosettes of the maidenhair spleenwort, *Asplenium trichomanes.* It always

THREE FERNS
In the center is Scott's spleenwort with walking fern at the left and ebony spleenwort to the right

MAIDENHAIR SPLEENWORT
Nothing is lovelier in the winter than the exquisite rosettes of this fern

seems incredible that such delicate beauty should be evergreen. Its larger relative, the ebony spleenwort, *Asplenium platyneuron,* may be found in similar situations or in the soil of hillsides. Only the shorter sterile fronds of this plant are evergreen, the tall fertile ones dying from the cold, but these are beautiful.

Another lover of lime rocks, although it is tolerant of a somewhat acid soil, is the curious little walking fern, *Camptosorus rhizophyllus,* that spreads rapidly by means of the proliferous tips of its fronds. These take root wherever they touch the mossy rocks, soon forming an interlacing mat of plants.

The walking fern sometimes crosses with the ebony spleenwort and the resulting hybrid is the rare Scott's spleenwort, *Asplenium ebenoides,* which partakes of the characteristics of both parents. Finding a plant of Scott's spleenwort furnishes one of the superlative thrills for the fern lover. Such moments make of him a fanatic for whom there is no cure, but happy are these hobbyists.

Another rarity of limestone regions is the tiny wall rue spleenwort, *Asplenium ruta-muraria,* while common species are the purple cliff-brake, *Pellea atropurpurea,* with its odd blue-green fronds, and the common woodsia, *Woodsia obtusa,* which is quite recognizable all winter. The beginner may feel quite sure of this latter fern by making its acquaintance in the winter, because the brittle fern, *Cystopteris fragilis,* with which it is so easily confused by the novice, is not evergreen.

Even the swamps have their winter ferns. The sterile fronds of the crested shield fern, *Dryopteris cristata,* form lovely leathery rosettes among the sphagnum moss and the dry, brown fruit of the sensitive fern, *Onoclea sensibilis.* The Davenport hybrid, *Dryopteris marginalis x cristata,* is found in swampy woodlands, as is Boott's shield fern, *Dryopteris boottii,* also thought to be of hybrid origin but now an established species. Here also one may find Clinton's fern, *Dryopteris clintoniana,* a much larger edition of *cristata.*

No mere fair-weather friends are these fascinating ferns. Our winter days will be richer for seeking them.

JUVENILE AND ADULT LEAVES

BY EDWIN D. HULL

It is well known that sometimes the leaves first put out by a seedling differ more or less from those which appear later. The first are known as juvenile, and the latter as adult, leaves. Perhaps the case most often noted is that of the arbor vitae in which the first leaves are awl-shaped and the later scale-like. An even better illustration may be found in the yellow pond lily or northern spatterdock, *Nymphaea advena,* since here not only do the first and subsequent leaves differ very much in appearance and texture, but their environment is quite different as well. The first leaves are short petioled and entirely submerged, arrow-

LEAVES OF THE NORTHERN SPATTER DOCK

shaped, reminding one of an arrowhead, and thin and papery in texture, while the later leaves are long petioled and floating, oval in shape and firm in texture. The contrast between the two forms of leaves is very striking. It is interesting, too, that the juvenile condition of this species resembles much the adult stage of the southern spatterdock *Nymphaea sagittifolia.*

The northern species is a common plant of wide distribution in quiet water, especially abundant from New York southward and westward. Seedlings may be looked for in summer in shallow water, where they may be easily reached by wading. In ponds of the dune country in northern Indiana, where specimens were observed, the seedlings appear in June.

ORPHANED FAWN FINDS A MOTHER

Fate had left the baby deer to fend for itself but the mother collie came to the fawn's aid

FOSTER MOTHERS

SOME ODD FAMILY MIX-UPS IN THE ANIMAL KINGDOM

BY
LEO A. LUTTRINGER, JR.

NATURE has her queer quirks—many of them. And foster mothership may or may not come within the scope of the unusual, depending upon how we look upon it. If we hear about, or even see, one creature mothering the young of another species we think how odd! Perhaps it is odd; but in my opinion it is not in the least unnatural. Why shouldn't any wild bird or animal extend its maternal influence to include the offspring of other birds or animals, providing the occasion arises? They do. And to prove it I am going to cite a number of authentic records, all of which required some time to amass. I have been fortunate also in securing photographs to support almost all of these cases.

The first records include the dog in the rôle of foster mother. There are quite a few of these. Out in Arkansas, for instance, we learn of a dog that adopted two pigs. Pennsylvania and Washington cite one case each and Michigan cites two cases of a dog nursing a pair of raccoons. Down in Talbot County, Maryland, a local sportsman is inviting his friends to see his rabbit-hunting sheep at work. This sheep was left an orphan while still in swaddling wool and was adopted by an old rabbit dog and raised with her puppies. It even follows the hound on the trail.

A mongrel dog that adopted a full-grown cat is playing an odd rôle. The two animals were both strays that turned up in the neighborhood of Riverside Drive, New York, where Miss Margaret Stranger picked them up and cared for them. She says "they are friendly at all times except when food is put out, which the dog insists upon eating, forcibly keeping the cat at a distance while doing so. However, as soon as she has finished she shares with the cat by allowing it to nurse." A Pennsylvania record tells of a beagle hound which raised a cat to maturity, and one of a dog which mothered a litter of cottontails. Another case from the Keystone State cites the mothering of three red fox kits by a bird dog.

A STRANGE EXAMPLE OF ADOPTION

The mule-deer fawn was cared for by the female goat and grew successfully to deerhood

Some time ago, on exhibition in the Ostrich

TABBY TAKES OVER A VERY HUNGRY FAMILY

A litter of young red foxes find the cat a satisfactory mother

House of the Philadelphia Zoological Gardens was a real demonstration of foster mothership—Nell, the hound, nursing two of the cutest lion cubs you ever saw. The cubs and her own puppies got along famously. At the Gwynbrook State Game Farm in Maryland we hear of a German police dog that is very friendly to a pair of bob-white quail, and while the dog has not acted as foster mother, she does allow the birds to alight on her back and walk all over her.

Our next case takes us down in Florida where is established an authentic record of a cub bear raised by a bird dog. Pennsylvania has two records of dogs nursing fawn deer—one dog was a collie, the other a rabbit hound. Another case of which I have record tells of a German shepherd dog that reared several white rabbits.

So much for the dogs—now for the cats! Cats will probably mother almost any kind of small mammal—in fact they are even desirable for this purpose at times. Silver fox breeders often breed and use cats to rear young kits which are deserted by the mother fox. Such desertion is not uncommon in captive-bred animals, and if it were not for the dependable old feline, fox breeders would lose a lot of money. Foxes, if molested, sometimes eat their young, and that is why such perfect quiet is maintained about the breeding pens. Usually only the caretakers are permitted near the areas.

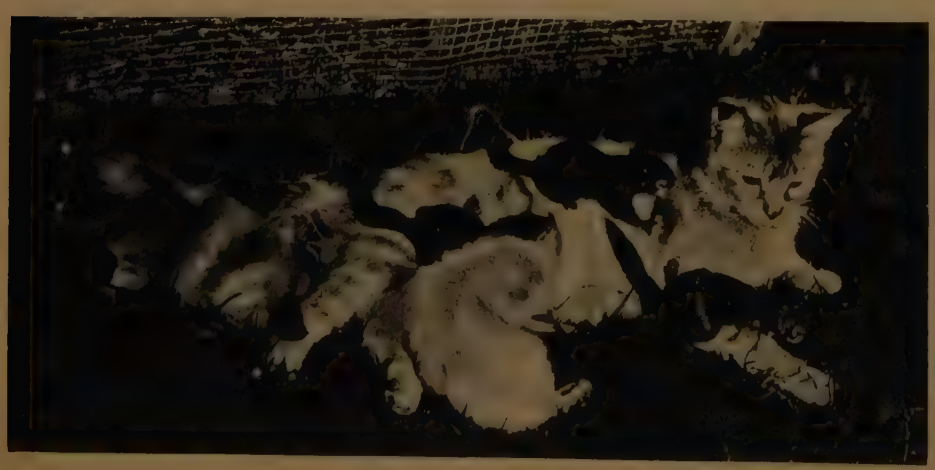
Numerous cases of cats rearing rabbits have been reported. I also know of several that adopted young skunks, and of one that mothered a pair of baby mice. Cases of cats adopting squirrels are fairly common. I have two interesting records of young gray squirrels nursed by a cat, and another of red squirrels. A deputy game warden in Montana goes one better, however, by citing a case where a cat raised two badgers, and in Gateway, Oregon, a cat deserted her four kittens to adopt a family of four coyotes.

Now cats may mother rats and mice, but how about vice versa? Sure thing! Disclosures that maternal rats will take young kittens into their nests have been made by Dr. Bertold P. Wiesner and Norah M. Sheard of the University of Edinburgh, Scotland. By experiment they learned that during the time when rats are mothering their young they have a tendency to drag young into the home nest. This retrieving, however, is not confined to their own offspring, but extends to other young rats, mice, and even the young of other species. The investigators placed young kittens in the cages of the mother rats, and the rats would drag them to their nests.

Other animals also have foster mothership tendencies, especially the ruminants. One of the best photographs of this sort I have ever seen depicts a white-tailed deer fawn energetically nursing from a large, placid cow. The funniest of my records, to me at least, is a case in Texas where a goat nursed an orphaned mule-deer fawn.

Probably the most practical foster mothers of our day used in administering to very young animals are the milk bottle and the medicine dropper, the latter being employed successfully even with very young birds.

And speaking of birds, we must not forget to include these on our list. I



A MIXED LITTER OF OFFSPRING

The baby red squirrels and the kittens found nothing strange in having the same parent

A STRANGE BARNYARD SIGHT

Orphaned, the fawn finds that the old family cow enjoys having a foster child

am inclined to believe that the instinct on the part of some birds to foster-mother broods of other species is even more natural than it is with mammals. In the domestic forms it is not uncommon to hear of bantam hens that mother young ducks, geese, turkeys, pheasants, quail, et cetera. I know of a case where a prairie chicken hatched and reared a brood of partridges. I also know of a case where a turkey tom mothered two young turks until they could forage for themselves. The peeps were about ten days old when the old tom took charge. He would perch on a low tree at night, soon after they learned to fly, and one would get under each wing. I recall another humorous incident about a wild turkey, told me by a game keeper. A duck egg was found in a stream near the turkey farm. It was placed in an incubator along with a group of wild turkey eggs. When the little duckling hatched it would have nothing whatever to do with the other ducks about the farm, but wandered around with the turkeys, even roosting in the trees with them. It was afraid of water and had to be forced to swim. I know also of a cock ringnecked pheasant that hatched two little ringnecks. He drove the female from the nest and took charge himself. Sometimes he would sit on the nest four days before getting off to eat.

About the song and insectivorous birds: A Pennsylvania record tells about a robin and starling nesting about twenty feet apart on the campus of one of the State teachers colleges. Mother robin was killed and mother starling reared both broods. She would not allow even the male robin to assist in feeding the young, and chased him away every time he showed up. An interesting case of a towhee that adopted a family of juncos is also a part of my files; also one of a redstart that reared a family of young robins, a pair of English sparrows that raised a brood of bluebirds, and a chipping sparrow that adopted young cowbirds. And speaking about cowbirds! Is there any of us that need be told of the countless birds that become, whether they want to or not, foster mothers to these lazy of laziest feathered creatures?

The female cowbird is an expert at locating nests. Evidently she watches smaller birds, learns where they are building, and then, while they are not watching her, slips in and deposits her egg. Sometimes the egg is laid long before the nest is completed. Occasionally, when an egg is thus deposited before the rightful owner of the nest has laid her eggs, the little birds build another bottom in their nest, sealing the heavy egg beneath the hair and vegetable fibre that comprise it. Yellow warbler nests are thus sometimes several stories high. My very good friend, Dr. George Miksch Sutton, Curator of Birds, Cornell University, told me that he had more than once found eggs sealed in the foundation material of the nests of larger birds, and that he remembers, particularly, one scarlet tanager nest that held two eggs of the owner and four of the cowbird, and there was an additional cowbird egg sealed in the foundation material.

There are no doubt many other instances of foster mothership not covered in this paper, and if it serves no other purpose than to bring these to light, I feel it will have been worthwhile. There may even be cases among the reptiles, amphibians, fishes and insects, but of these I have no record. There is much in Nature yet to learn.

A REAL MIX-UP

Besides her own puppies, this dog added two hungry lion cubs to her family

HIJACKING A SUGAR ROBBER

BY
DR. DAVID LIVINGSTON CRAWFORD
UNIVERSITY OF HAWAII

SOME robbers snatch things out of your pockets, others sneak into your home when you are away, while some go into the bank where your money is kept and steal all they can find. The robber in this story is of the last kind, except that the bank he steals from does not keep any money in it, but sugar.

The leaves of the sugar cane plants, waving in the sunlight of the Hawaiian Islands, are busy all day long making sweet sap for the growing parts of the plant to "eat." The sugar cane plant is thrifty, each day making more sap than it needs and storing the surplus in the thick, pithy stalk. This stalk, therefore, is really a savings bank.

When this bank is full, it becomes a golden harvest at a big, noisy sugar mill where the stored-up sap is made into sugar. That is, if some robber has not gotten into the bank before the harvest. Right there our story begins.

The robber is a beetle. He is dark brown in color, and about a half-inch long. He is sometimes called a "bill-bug," because the front end of his head is prolonged into a "bill," something like an elephant's trunk except that it is stiff and hard and has a pair of jaws at the end.

He came to Hawaii about fifty years ago as a stowaway with some sticks of sugar cane being imported for planting. Some of these beetles thus got into the cane fields of Hawaii and established their families. In the course of time, they became so abundant that they were eating the sugar before the fields were harvested. They were clever about it, however, and got into the cane stalks in such a way that they were not easily noticed. Robbers are always that way. In fact, the grown-up beetles did not do the robbing at all, but they had the children do it!

One of these beetles starts out in life as a tiny egg. Out of this egg hatches a little worm, or grub, which eats greedily for several weeks and then becomes quiet and forms a sort of cocoon. Out of the cocoon there finally emerges the full-grown beetle, and the cycle of life is completed.

In the case of this sugar robber, the mother beetle is careful how she lays her eggs. She walks up a sugar cane stalk and, with her jaws at the end of her little trunk, she gnaws a tiny hole through the hard, outer rind of the cane. Then she turns around and deposits an egg in this hole. This done, she gnaws out another hole for the next egg, and so on, until all her eggs are placed.

ROBBED, ROBBER AND HIJACKER

A piece of sugar cane showing the tunnels and the grubs in them, with the beetle (2), the beetle grub (4), and the pupa (5). Above (7) is the hijacking fly, while (8) is the beetle grub with the destructive maggots of the fly partly buried in it

For a week the egg lies at the bottom of the little hole, all the while developing inside. At the end of a week a tiny worm emerges from the egg. It has no feet and cannot walk, but there is an abundance of food all around it. Inside the outer rind, sugar cane is soft, pithy and sweet. The newly-hatched beetle grub, therefore, finds life easy. As he eats, he moves along slowly by a wriggling movement, and gradually forms a long, crooked tunnel through the pithy interior of the cane. All the while he is growing larger and fatter, so the tunnel becomes larger. This goes on for about two months, the grub then reaching its full growth without ever having been outside the cane stalk.

Now the full-grown grub, no longer caring for food, digs a large cavity in the cane stalk, wraps itself up in a

bundle of sugar cane fibres, and goes to sleep. This bundle is a sort of cocoon made by weaving the cane fibres around its body in all directions, with the ends neatly tucked in so the threads will not unravel. It looks like a coarse imitation of a silk-worm cocoon.

In the little chamber within the cocoon the grub goes to sleep, rocked by the swaying of the cane. While he is sleeping, his body is slowly transformed from a worm to a beetle. This takes about a week. Then the beetle awakes. But he finds himself imprisoned inside the cane stalk. He pushes his way out of the cocoon. He feels around the walls of his prison until he finds one spot where the wall is very thin. By using his jaws, which are still new and scarcely fit for hard work, he forces a way through this thin spot into the outside world.

COCOON MADE BY THE GRUB OF A BEETLE

Now it sounds as though he merely had a little stroke of good luck when he found that thin spot in the wall. But it had all been planned. The grub, by some remarkable instinct, seemed to know that something of the kind would happen. In gnawing out the chamber in which the cocoon was to be formed, the outer rind of the cane stalk was cut almost through, but not quite. Just enough was left for protection, and not too much to imprison the beetle.

SIDE VIEW OF THE PARASITE FLY THAT WAS SOUGHT FAR AND WIDE AND WHICH KEEPS THE BEETLE CHECKED

Now for the hijacker—one who robs robbers. The sugar robber had become a great menace to the sugar planters in Hawaii. Nothing they did put a stop to his sly and costly work. Finally it was suggested that they try to find some kind of parasite which would kill the beetle robber. They determined to send an entomologist to other cane-growing regions to find a hijacker. Six months in southern China, more months in the Malay Peninsula and Java, and a sojourn with the fevers and head hunters of Borneo yielded nothing. Then, on the Island of Larat, the searcher found some of the same beetle robbers that infested Hawaii. But he could not seem to find any parasite. Then tropical fever struck him, and he had to leave. Well again, he was restless, confident that in Larat he had been on the verge of success.

ENLARGED VIEW OF THE ROBBER BEETLE

His strength sufficiently recovered, our entomologist, whose name was Frederick Muir, set out again for Larat. This time he looked for the beetle in other plants, and found it in sago palms, which grew wild all over the island. He dug out some of the corners and found a parasite! It was a fly somewhat like the common housefly, although different in habits. He studied the fly and thought that it might turn the tide of battle in Hawaii. But, how to get these delicate little flies, alive, to Honolulu! Larat was far from the regular course of trans-Pacific steamers. He would have to ship the flies by slow little boats to Australia, and then from Australia to Honolulu, requiring many weeks of passage. And the flies lived only a week or two!

A ray of hope lay in the possibility that on the island of Papua, New Guinea, which is situated between Larat and Australia, he might find the same parasite fly. Sure enough, he found the robber beetle there and the same parasite fly. Still there were no steamers travelling direct to Honolulu. So a base was established in Australia and, after Muir had suffered several failures and another attack of fever, some live flies finally made the trip.

From Australia to Honolulu the steamer service was better. Once in Hawaii, the flies were carefully tended for some months and allowed to multiply before being turned out in the cane fields. In a few years, this new parasite fly had so greatly reduced the robber beetle in numbers that the sugar planters no longer feared him as a menacing foe. And this is how the hijacking parasite fly operates:

We have already explained how the beetle drills a little hole in a cane stalk in which to hide each of her eggs. The parasite fly, with a remarkable instinct, searches out these holes and deposits one or several of her eggs at the edge of each. She produces several hundred eggs, holding them in her body until they are just about ready to hatch. Indeed, sometimes they even hatch within her body and tiny worms emerge from her egg-tube, instead of eggs.

The egg, deposited at the edge of the hole, hatches and the little footless maggot wriggles into the hole in search of food. It cares nothing for sugar. It wants meat in the form of the beetle grub which has hatched out of the eggs at the bottom of the hole and has bored a tunnel into the cane stalk. Along this tunnel the parasite maggot wriggles, until the grub is overtaken. The parasite attaches itself to the grub, burying its pointed head within the fat body, and proceeds to feast continuously. This does not kill the beetle grub, even when several parasite maggots feed on one

grub, but it seems gradually to weaken him. At length, when the grub weaves its fibrous cocoon and goes to sleep inside, the parasite strikes its final blow. The grub body is consumed and the maggots use the fibrous cocoon in which to make their own transformation from footless maggots into winged flies. When these latter emerge from the cocoon, they are imprisoned within the cane stalk, but an instinct guides them to walk back through the dark tunnel which the beetle grub had made, until finally they come to the opening where it began, the hole at the edge of which the mother fly had laid her egg. And they go forth to carry on the cycle of life.

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AN ANCIENT INDIAN LOOKOUT

BY BRUCE BRYAN

IN THE Little Dragoon mountains of southeastern Arizona is a stretch of boulderous and precipitous country rich in relics of the past. Centuries ago this region was inhabited by the Ho-Ho-Kam, also known as the "Red-on-Buff People" because of the curiously decorated pottery they made. The Ho Ho-Kam dwelt both in highly situated caves approached by narrow declivities and in stone-and-adobe walled houses and pit rooms on the flat surface of the range. In the caves were stored water and grain in huge clay ollas, and when an enemy attacked the segregated villages the natives retired to the more defensible mountain clefts.

From the number of these natural caves which show signs of prehistoric Indian occupation and which overlook village sites on the more level rangeland, it is obvious that the Ho-Ho-Kam lived in a more or less continual state of apprehension of the nomadic tribes who preyed upon them for food, weapons and women. The early inhabitants of the Little Dragoons were fortunate in that they possessed a natural lookout from which they could keep a constant watch for the approach of their enemies. In one of the enormous boulders guarding the sloping, treacherous approach to the mountain caves is a huge hole approximately four feet in diameter, apparently the result of some curious phenomena of wind and sand erosion.

Crouched behind this natural window, an Indian sentinel was afforded an uninterrupted survey of an expanse miles in area in all directions stretching away from his mountainous retreat. The coming of a hostile band could be spotted, during the daytime, miles before it could reach within effective striking distance, giving plenty of time to alarm the villages and permit the people to flee to the caves.

Warlike Apache bands used both the caves of the Ho-Ho-Kam and the natural lookout as recently as the last half century in their bitter struggle with the white settlers. Silver and tungsten have been found in great quantities in this region, and many are the old ranchers and their wives who can still recall nights when they sat up till dawn with rifles across their knees listening for the stealthy footsteps of a painted Apache scout.

A VANTAGE POINT
From here the Ho-Ho-Kam Indians could watch the approach of their enemies

MODERN SENTRIES
When enemies were sighted the Indians retired to caves as at the left

THE LOGGERHEAD—LIKE A CREATURE FROM AN ANCIENT WORLD

THE LOGGERHEAD

BY W. L. McATEE

PHOTOGRAPHS BY CAPT. J. A. CLARK

OF THE three common kinds of sea turtles, the hawksbill is exploited for tortoise shell, and the green turtle for its flesh. The remaining one of the trio, the loggerhead, seems not to offer any special temptation to man, but like the others has its nests robbed to an extent that threatens its abundance.

All of the sea turtles are giants of the tortoise race, and the loggerhead attains to four feet in length of shell, and to from 250 to 350 pounds in weight. The sea is the loggerhead's element and if he is swift enough to catch fishes and squids upon which he is reported to feed, he must, when full grown, be monarch of all he surveys. Winging—for we may use this word for the flipper action when the heavy body is supported by the dense sea water—his way through the translucent depths, his huge bulk cleaving the green water, his powerful flippers thrashing like propellers, the loggerhead presents a picture from an ancient world, and to his hapless prey must seem a superlative monster.

From enemies the loggerhead must be nearly free until the necessity for egg-laying forces the females ashore. Then many dangers are encountered. It would seem certain that turtles are descendants of land-dwelling forebears because all of them deposit their eggs in holes they dig in soil. Regardless of how exclusively they may keep to the water at other times, when the season comes for the laying of eggs to reproduce their kind, ashore they must go.

If it were not for this necessity, the loggerhead turtle would lead a more carefree existence, but on the other hand we should know less about it. When it comes ashore, we are enabled to see it face to face, and one who has been close to these monsters will not fail to give them credit for being impressive examples of Nature's handiwork.

Hauling out preparatory to egg-laying, in itself is a problem because the loggerhead's flippers, while eminently adapted for underwater progression, are a poor reliance for crawling on land. They cannot support the great weight of the turtle's body and crawling is a laborious dragging process. The underside of the body armor of the loggerhead is the flexible part and must move in deep breathing, hence the danger of suffocation is faced by turtles crawling on land; if their flippers become exhausted so that they cannot give relief from pressure on the lower surface, the turtle can breathe only feebly and eventually not at all. This peculiarity of structure is one of the reasons captive turtles are turned on their backs; it keeps them from crawling, true, but also is necessary to keep them alive.

Here then is a great danger threatening the female loggerhead the whole time she is out of the water. Nevertheless she must face it, and on gently sloping sandy beaches of the Sea Islands of Georgia, these turtles haul out at night from about May 10 to August 10. Due to their great weight they leave trails the central part of which, where the body slides along, is like a broad smooth furrow. On each side is a rippled ridge made by the flippers in their pulling exertions.

The females come in mostly on the rising tide, presumably to shorten the laborious crawl, but even so the beach may be broad and the turtle very tired when she

reaches her goal a point near ordinary high-water mark. In such cases she must rest, in others she is ready to begin excavation of the nest cavity. This is done by the hind flippers, and a nearly circular pit eight by ten inches in diameter and nearly two feet deep is scooped out.

A PILE OF LOGGERHEAD EGGS
There are 152 in this pile but as many as 164 have been found from one laying

Egg-laying safely begun is a process almost as steady as clockwork, the eggs being laid one at a time every two or three seconds. The average number of eggs to a nest is about 140 but as many as 164 have been found. Nests made the latter part of the season contain fewer eggs, perhaps second layings.

The difficult crawl and the strain of egg-laying weaken the turtles so that their progress seaward is even slower than the landward journey. When at last they reach the laving waves, one can sense their feeling of being at home again and so glad to be there. Once in a few inches of water there is no catching them. Occasional females become confused and start crawling landward from their nests. If they persist in this course until over the first ridge into dry loose sand, they are doomed. They cannot crawl back and the hot sun of the next day soon kills them. Bleached skeletons testify to such tragedies.

The eggs are spherical, about an inch and a half in diameter, and have a flexible shell. The hatching season is August and September and the young crawl out of the nests at night. They make straight for the sea and cannot be induced to crawl in any other direction.

Nests of the loggerhead, like those of all turtles, are pilfered by various enemies. Whatever the natural enemies may have been, it is certain that their effect was insignificant compared to the depredations of hogs, where they are present, and of man on favorite accessible beaches. To man at least, the locating of the nests is easy. The broad trail is like a road and the nest is near or at the end of the road. A little probing with a stick discloses the eggs by their softer feel and perhaps by traces of the contents of one or more injured by the prodding process. The nest found, all are taken; no one thinks of leaving nest eggs. The extent to which the eggs are gathered on some beaches must be a serious threat to the continued existence of their loggerhead visitors. There should be a degree of protection.

Turtle eggers seem to have a veritable passion for this food in season, though the "why" of this remains a mystery to the writer. The shells are tough and can scarcely be opened except awkwardly, the white remains glairy regardless of the amount of cooking, and the yolk resembles coarse dry corn meal both in consistency and taste. If this is a delicacy, surely there's no accounting for taste. Turtle eggs are not an essential food, so let us hope that in time change of style, common sense, or mayhap even compassion will end the nest robbing.

FLIP

BY ROSS E. HUTCHINS

FLIP was not exactly a normal frog as frogs go, but he got along in the world, or, rather, the pond. His eccentricity lay not so much in his personality as in the fact that he sat on what he didn't have almost.

In other words, Flip was so unfortunate as to enter this world minus his hind legs. There was no sign of these most necessary appendages. If he had been a human being his life would have been one of leisure with a travelling show or circus, but circumstances alter fortunes and so he was forced to fend for himself among his more able brothers and sisters. Even in the face of such difficulties he captured insects and grew up along with the best of them. When he attempted to hop in approved frog fashion he flipped over on his back, and when he tried to swim he could only dive down into the water since his lack of legs over-balanced him.

But it seems that adversity has its rewards and he now spends his leisure hours on a lily pad in the goldfish pool.

FLIP CAME INTO THE WORLD MINUS HIS HIND LEGS
Thus he was not able to hop about as other frogs do but he spends a happy life on a lily pad in a goldfish pool

THE BEARS OF ADMIRALTY

Admiralty Island, Alaska, holds among its timbered and mountain fastnesses some of the largest and finest bears now left in the world. That they may be preserved in their natural environment, setting aside the island as a sanctuary is being sought by those who realize the interest and value of a wild life heritage such as these bears represent. Today they are the victims of some illegal shooting by Indians, commercial salmon fishermen and other poachers, but on the island lives Allan Hasselborg, guide and friend of the bears. He guards their interests as best he can.

With his cameras, Arthur Newton Pack, president of the American Nature Association, has twice visited Admiralty Island to photograph the bears. During the last summer a special expedition was made for this purpose, Mrs. Pack and Frank Hibben, with Mr. Hasselborg, making up the party of four. Many feet of film were exposed, yielding probably the finest photographic record known of these great mammals. Experiments were tried to discover the reaction of the bears to the strains of the accordion and the explosion of fire crackers. These were recorded on the film.

In the pages that follow are some pictures of these bears culled from the motion picture film. They tell their own story of the thrilling experience of photographing these citizens of Admiralty at close—often dubiously close—range. Here our readers may share in this experience from the safety of their easy chairs at home.

Shooting from the blind. Mrs. Pack at the motion picture camera and beside her Frank Hibben with the gun that was never fired, but carried for protection in case everything else failed. Below is one of the big brown bears of Admiralty, called grizzlies by some because they are thought to be related to our own western grizzlies. Brown bears grow larger than any others in the world, and some of the very large ones weigh two thousand pounds

At the left a bear gazes hopefully into the stream seeking salmon to catch. The fish are swarming up the shallow stream by the thousands, fighting to the spawning ground. At the right he looks down into the water as the big silvery salmon dash between his legs. In a moment he will put his big paw down on one and then pick it out of the stream in his mouth. Ah, look below, he has neatly caught himself a hearty tidbit

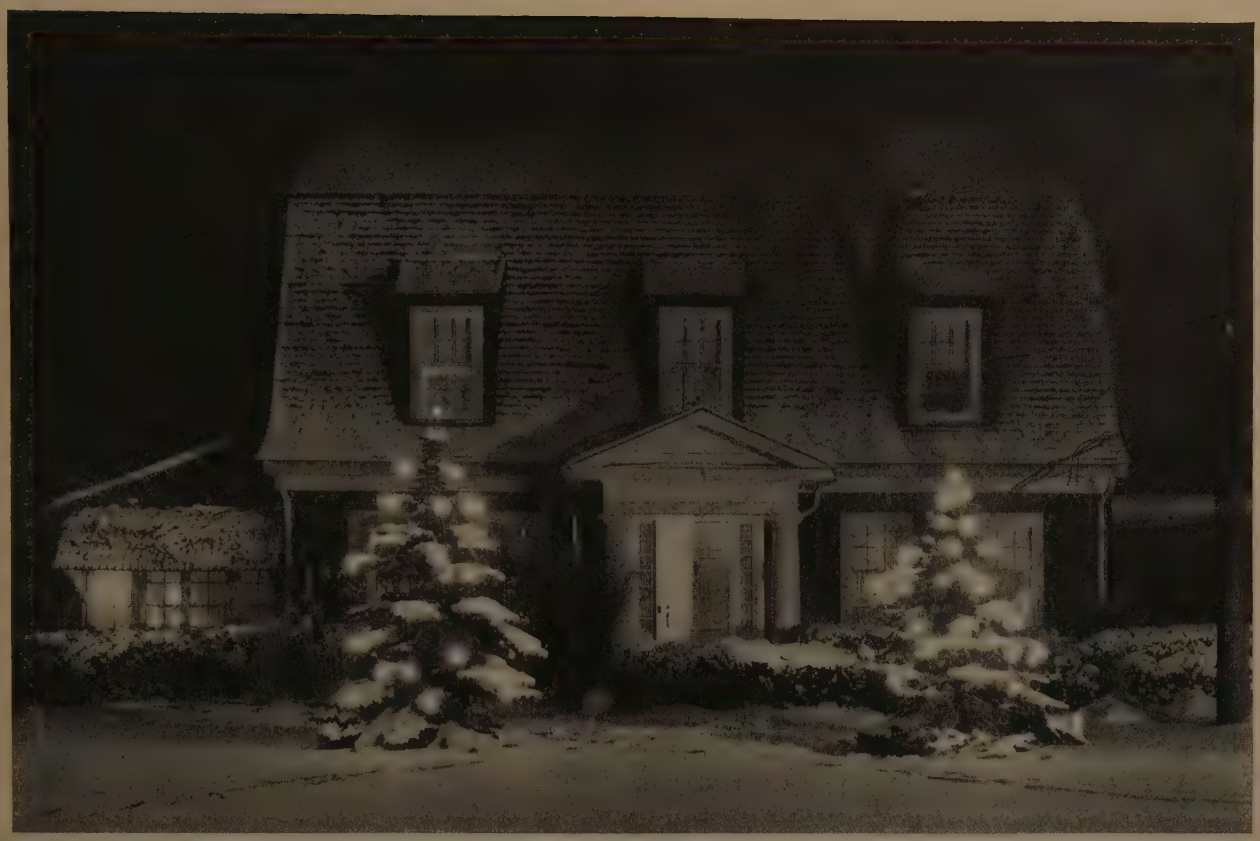
At the top he has gotten down to the serious and important business of eating. Two or three such fish will satisfy a big bear for a day. But he is interrupted by those pesky humans with black boxes that buzz. He lays back his ears and snarls his opinion of these uninvited guests at the feast. He is really mad and gets up to move menacingly toward the camera. The photographers stand their ground. They talk to the bear and suggest he go mind his own business. He growls but four humans are three too many. So he edges away and goes back to his fishing in the stream

This time he fishes only for fun, just to show how fearless he is, and how big and strong. He plays with his fish, juggling it in the air like a cat with a mouse. He was full of salmon and did not want to eat but he had to show off a bit. But, asks Mrs. Pack, will music soothe the wounded vanity of the bear? Anyway, she has brought her accordion along to try it out, and while she will not vouch for the high quality of the music she feels that there is no musical critic among the bears

The first to arrive at the concert are two little brown bears whose mother was probably shot illegally and "just for fun" by some commercial salmon fisherman. Then one of the cubs, which is nearly as tall as a man, stands up to see what it is all about. They find it is man so they run away, not trusting him, for which you can hardly blame them. Then an old bear pokes his nose from the windfall and sniffs the air as though he could smell the noise that comes from the busy accordion

At last comes a big brown fellow with all the assurance of the unafraid. He takes a cool look at the cameras. They awe him not at all and he decides to put on a special exhibition of his strength and prowess. The first movement is to shake himself all over, which he does most thoroughly. Then he goes into such transports of shaking that he begins to droop lower and lower. Even his big head twists from side to side

Finally the bear lies flat on his stomach with his paws out-stretched. He gazes at the cameras. Then he raises his head to see whether the humans were properly impressed by his antics. Below, the party encounters a bad grizzly. He bars their way to their boat. He charges them and is only stopped fifteen feet away when the guide hurls his hat at him. He stops and tears up the hat, then comes on. Only a lucky hit with a large rock is successful in discouraging the bear and opening the way home



THE HOME EVERGREENS EXTEND A FAMILY CHRISTMAS GREETING

Not only do they set off the home by supplying welcome patches of color in the winter but they serve a useful and attractive purpose during the holiday season

THE COLORFUL WINTER GARDEN

BY DOROTHY E. PLETCHER

"FOR DECEMBER, January and latter part of November," wrote Francis Bacon in the sixteenth century, "we must take such things as are green all Winter, Holly, Ivy, Bays, Juniper, Cypress trees, Yews, Pines, Fir-trees, Rosemary, Lavender . . . encompassed on all four sides with a stately arched hedge . . . with some pretty pyramids I like well." And we thought our idea of having winter gardens rather novel!

Of yore the main question concerning a plant was "What color are its flowers?" Now, desirous of a colorful winter garden, we query, "Will it display brilliant foliage or bright-colored fruits or attractive bark in the winter, in addition to its show of flowers in the spring?" In order that the beauty of our home grounds be a year-round affair, we must select many plants of evergreen character in planning, first, for the specimen trees on the lawn, then proceeding to the boundary planting, windbreak, hedges, foundation planting, wild garden, vines, groundcovers and rock garden.

Specimen trees we place so that they frame the house, or when in front of border plantings, at the salient points of the border outline. We never polka dot them all over the lawn. Excellent deciduous specimens for the lawn, which by their color and shape contrast well with evergreens, are the various hawthorns, flowering dogwood, *Cornus florida,* sweet gum, smooth sumac and white birch. A bit of study will decide which trees to group together and which to plant singly. The white birch and the balsam fir make a charming combination. Oriental spruce, Nordmann's fir and Koster's blue spruce look well together, too.

This idea of having a living tree illuminated on the home grounds at Christmas time—the Nikko fir is ideal—is a big step toward conserving our supply of Christmas trees, even though the U. S. Forest Service says that the removal of some trees annually improves the forests.

Evergreens to plant as specimens on the home grounds include: Nordmann's fir, cedar of Lebanon, deodar cedar, Canada spruce, silver fir, blue spruce, white pine, and Nikko fir.

We want our boundary planting to have an uneven sky-line, so we'll plant shrubbery centers from which other groups lead off in waves to low plantings. This arrangement will retain the best views and screen the undesirable ones. The pyramidal type of evergreen, such as arborvitae, cypress and juniper, help to give this picturesque accentuated note to the border, which must also wind sinuously in and out, like a series of bays and pro-

U. S. FOREST SERVICE

COLORADO BLUE SPRUCE

Transplanted from the natural setting in which it grows here, it is a lovely addition to any home grounds as a bit of winter color

jections, thus escaping both convention and monotony.

For a stalwart all-winter screen or windbreak, nothing can surpass Norway spruce, American arborvitae, Canada hemlock or white pine, any of which can be sheared into a high, impenetrable hedge-screen. The deciduous European hornbeam, European beech and blackhaw could be added for variety.

Fascinating indeed are the trees and shrubs with distinctive colored barks mixed in the boundary planting. Have you ever seen a mass of Siberian dogwood near the yellow-twigged dogwood? Other striking effects may be had with the wing-barked euonymus or the green-twigged and the red-osier dogwoods.

You've admired shrubs with bright-colored fruits against a background of evergreens? Then you'll want to distribute some in front of your boundary planting or wall of green, not only for their beauty, but because they will bring the birds to your shrubberies. John Burroughs, you know, said that insect-eating birds would starve if they did not have berries. The U. S. Biological Survey will tell you the favorite berries of certain birds.

Bright-berried shrubs for the boundary planting include: *Berberis thunbergi,* Japanese barberry; *Berberis thunbergi atropurpurea,* red-leaved Japanese barberry; *Cotoneaster divaricata,* spreading cotoneaster; *Euonymus atropurpurea,* Wahoo or burning bush; *Euonymus europaea,* European burning bush; *Ilex opaca,* American holly; *Pyracantha coccinea lalandi,* firethorn.

"Burning bushes with glowing lamps." That phrase has been used to describe euonymus, but how well it pictures all the red-fruited winter shrubs suitable for the forefront of the boundary planting. Although there is a great variety, let us select *Cotoneaster divaricata,* loaded with bright red fruit in clusters of three, *Euonymus atropurpurea,* ablaze with hanging crimson fruits, *Euonymus europaea,* the spindle tree, so called because long ago its wood was used for making spindles for use in looms, and *Pyracantha coccinea lalandi,* lovely with orange-scarlet fruit. And you will find countless other cheery ones listed in the catalogues.

The American holly, which looks so well in the boundary planting, really should be more widely grown, for the greedy onslaught of commercial interests is fast destroying it. At the Boyce Thompson Institute for Plant Research, Dr. P. W. Zimmerman is experimenting with growing holly from cuttings.

"Plants from cuttings produced fruit during the first year," he told me. "The seedling must grow five to eight years before it flowers. I now have in the field about 4000 five-year-old plants from cuttings and 5000 or 10,000 five-year-old seedlings. They grow about equally well in the field, the difference being that the cuttings produce fruit earlier than the seedlings."

Now, if high and impenetrable hedges are not compatible with the plantings in your neighborhood, you may desire lower hedges, preferably of evergreen material, because it is beautiful the year round, particularly in winter.

Low or medium hedges include: Deciduous: Japanese barberry. Evergreen: boxwood, Japanese holly, dwarf arborvitae, Japanese yew, Japanese box.

Small wonder the deciduous Japanese barberry is so widely used as a hedge plant, because, in addition to its hardiness and ease of culture, it is green in summer, tinted in the fall, and strung with gorgeous red berries throughout the winter. It is a native of Japan where it was discovered and sent to the St. Petersburg Botanic Gardens by the Russian botanist, Carl Maximowicz, in 1864. The Arnold Arboretum, near Boston, received seeds from St. Petersburg in 1875, and shortly afterward distributed the

plants in this country, where it has become popular.

One look at lovely old-time gardens explains the boxwood's charm. Although common box is scarcely hardy in New England, Japanese box, *Buxus microphylla,* which is not well known, and its taller growing variety, *japonica,* are both hardy in that exacting climate. Japanese yew is probably the most suitable of all medium hedges for New England. The Japanese holly, a valuable evergreen holly, is well adapted for making hedges, as it forms a stiff bush with its short, dense branches hung with black fruit.

Dwarf hedge plants include: dwarf boxwood, dwarf eastern arborvitae, Japanese yew, small-leaved Japanese holly, dwarf hedge yew, box barberry.

Among plants of a low, compact habit, used to emphasize a line or design, dwarf boxwood, *Buxus sempervirens suffruticosa,* is a great favorite. As a substitute for it in cold climates we can trim both the flat form of Japanese yew, *Taxus cuspidata,* and the dwarf hedge yew, *Taxus canadensis stricta.*

In arranging the foundation planting, the function of which is to connect the house with its surroundings, we will assuredly avoid those two mistakes so commonly made, i.e., we will not place tall-growing plants in front of the windows where they will cut off all light, nor will we assemble a hodgepodge collection of coniferous evergreens of many sizes, shapes and hues. Show some of the foundation by bringing up a group of foliage between the windows, using small evergreens for high points or accents at the corners. Between them fill the space with small plants, having the outline of planting extend out at the corners and recede to the face of the house.

To secure foliage, flower and fruit we use evergreens, deciduous shrubs and broad-leaved evergreens, the green foliage of the latter in winter making them particularly valuable around the house. Place the taller varieties at the rear, those of medium height in front of them, and the dwarf plants for edging. We want several deciduous shrubs for spring bloom in the middle group where their defoliated branches in winter will be hidden by the front row of evergreens. Recently I saw an effective foundation planting where the tall evergreens were Douglas spruce and hemlock, the middle plants of laurel, rhododendrons and yew, and the edging of pachysandra.

Plants of three heights for the foundation include: Tall: Douglas spruce, hemlock, Japanese yew tree, and American arborvitae. Medium: Japanese barberry, *Berberis julianae,* mountain laurel, holly-leaved mahonia, Japanese yew, Japanese holly, rhododendron. Dwarf: Pachysandra, *Daphne cneorum,* drooping leucothoe, dwarf yew, dwarf hemlock, dwarf arborvitae, dwarf mountain pine, dwarf juniper.

"Perhaps," says one nurseryman, "Nature has endowed you with an attractive landscape . . . areas of laurel and copses of sumac. . . . You can take every one of Nature's mere suggestions and make a feature of them. If a bittersweet clambers over an old stump, why can't a hundred bittersweets set a hundred spots aflame?"

Why don't we take a tip from Nature in doing a bit of naturalizing around our homes? What to use? There are three sparkling chokeberries, with fruits red, purple and black. Then there's *Ilex glabra,* the inkberry, with small black berries, a native shrub making a round green bush about three feet high, like box; also *Myrica carolinensis,* or northern bayberry, a shrub eight feet high or less, with clusters of berrylike nuts covered with a whitish wax, valuable for bouquets and candle making.

And don't overlook *Viburnum lentago,* the nannyberry or sheepberry, decked with blue-black berries, nor

BUREAU OF PLANT INDUSTRY

BRANCH OF CHINESE HOLLY

With its rich green leaves and its berries there are few lovelier shrubs to plant for year-round adornment of the home grounds

the semi-wild, shade-loving staghorn sumac which simply revels in rocky, deep soil. With shining red berries clustered around its stems, the common winterberry is a familiar decoration at Christmas. The witch-hazel, *Hamamelis virginiana,* grows eight to fifteen feet tall and displays threadlike, yellow flowers which do not appear until late in autumn or in early winter after the leaves have fallen.

GROUP OF PFITZER JUNIPER

They, in turn, embrace a spiny Greek Juniper, giving an effective all-year display, while such boxwood as that below at Gunston Hall in Virginia is the glory of any home ground

There are hardy evergreen vines which brighten the drab fences, sandy banks and walls of the winter garden tremendously. *Euonymus radicans vegetus,* the bigleaf wintercreeper or evergreen bittersweet, loaded with orange-red berries, is the best evergreen wall cover for America. Being a root-climber and having excellent evergreen foliage, it does well at covering walls and the north and west sides of buildings. Planted in a row and sheared, it can also be used for edging paths which need such help.

It has been predicted that when *Euonymus radicans colorata,* with its leaves tinted red-purple, becomes more widely known, it will be eagerly planted. It was introduced into this country by the late Frank N. Meyer, one of America's outstanding plant hunters.

Scrambling picturesquely over trees and fences, *Celastrus scandens,* our common native bittersweet or waxwork—it is an excellent shrubby climber—produces an orange-yellow capsule which opens in autumn, revealing a scarlet-colored seed, both of which remain on the plant well into the cold season. Cut some branches just as the fruit commences to open and place them in vases without water. They will retain their ornamental value throughout the winter. If thousands of gardeners would grow such plants for Christmas decorations, what it would mean to the cause of preserving our rapidly vanishing holiday greens!

Dwarf forms of evergreens, such as the Sabin juniper and Mugho pine, make charming backgrounds for the rock garden. Broad-leaved evergreens to use for winter effect in the rock garden and as groundcovers? There's the bearberry, *Arctostaphylos uva-ursi,* a trailing shrub with thick glossy leaves and red fruits throughout the winter, valuable as a groundcover on dry, sandy, or stony soils. Ideal for the rockery is the Chinese warty barberry, *Berberis verruculosa,* the late Dr. E. H. Wilson's favorite of the barberries he discovered and introduced. With its dark green holly-like leaves and black fruit, it grows from two to four feet high.

And have you noticed how lovely the almost prostrate red-berried rockspray, *Cotoneaster microphylla,* looks when planted on top of stone walls, trailing curtainwise? We've admired, too, the little trailing evergreen, *Daphne cneorum,* a native of the Caucasus, not exceeding a foot in height, and the diminutive baby wintercreeper, *Euonymus radicans kewensis,* excellent for carpeting the ground. The aromatic creeping wintergreen or teaberry, *Gaultheria procumbens*—its bright red spicy berries remain sometimes until spring—thrives only in partial shade. We'll plant it about the foot of trees, also an ideal location for *Pachysandra terminalis,* about ten inches tall, which flaunts pleasant green foliage all winter. *Pachystima canbyi* forms a green velvety rug. So, too, does the cowberry's, *Vaccinium vitis-idaea,* dense, broad mats of shining green leaves and dark red fruits. Nor could we do without the Scotchman's bonny heather.

Did you know that on an unsightly bank you could use creeping juniper, handsome with blue-green foliage, mountain laurel, resplendent with leaves at all seasons, and the red and black chokeberries? The red-fruited coralberry or Indian currant, and the white-fruited snowberry are splendid here too, particularly in the shade.

We plant evergreen shrubs in the spring. Why? The fact that they hold their foliage all winter makes it necessary that their roots be very thoroughly established before the advent of cold weather. Your favorite garden catalogue will tell you how to plant and prune. Plan now.

DO YOU READ THE SCIENTIFIC NAMES?

BY LUCY MARIA PRESCOTT

CHAIRMAN, DEPARTMENT OF LATIN, ABRAHAM LINCOLN HIGH SCHOOL, BROOKLYN, N. Y.

THE next time you see a gray squirrel dart across the lawn, remember that "Little Shadow-tail" is his real name, and watch his tail float out as lightly as the shadow of Peter Pan—the shadow Peter lost that day at Wendy's house, when they shut the window down too soon and caught it there.

When you pass a colony of western prairie dogs, think of their Greek and Latin name, *Cynomys ludovicianus* which tells in nineteen letters that each one is a sort of dogmouse (because it sits up and barks like a small dog), and that it lives in "Louisiana," which was the name given to all the northwestern country, where the prairie dog lives, when this was purchased from France by the United States, and where Lewis and Clark, who were sent by President Jefferson to explore the new country, first found the animal—and if you should happen to see one of those ferrets that live in the prairie dog colonies for the best of reasons, and should see his black feet, and possibly get a whiff of his musky odor, you may be helped to remember that his name is *Putorius nigripes*—*Putorius* from the Latin *putor,* stench, and *nigripes* also Latin because of his active black feet. And, furthermore, it is interesting to know that a naturalist who wrote an account of the ferrets' habits once named him *Cynomyonax,* king of the prairie dogs, in playful allusion to the fact that he lives upon them. This name is sometimes used to indicate that our ferret differs somewhat from the others of the old world.

At first each strange word appears to be only a jumble of letters, useless and hard to read; but soon, with their help, we see more clearly the characteristics of the animals and plants, and we do not forget. Their accuracy and completeness seem to give everybody a second pair of eyes and a fresh memory. They are names, too, that we can trust. The starling has no relation to the stars; the bat has no place at a baseball game; but *Cynomyonax nigripes* will always be the black-footed king of the prairie dogs.

Many of the Greek and Latin roots are already familiar in the words we use every day. For instance the Duck-billed Platypus of the September *Nature Magazine* is an Australian animal with a Greek name. *Platy-* means broad and flat, and *pus* is foot. The flat feet are there in his photograph. We know the last of the word in the name of the octopus, which has eight arms that seem like feet. The first part is found not only in Platyhelminthes, the scientific term for the flatworms, but also in plateau, platter and plate. Platinum can easily be rolled into flat sheets, and a platitude is a flat remark. This *platy-* root has proved so useful to the scientists that it appears in the names of several pages of snakes, insects, birds and plants, while everybody carries it on each side of his neck in a good broad muscle called a *platisma.*

Many roots occur so often—for heads, feet, color, size, habits—that we recognize them almost like English. *Oura,* the Greek for tail, comes into English as *ura* and *uro–,* and has nearly disappeared in the word squirrel. Frogs are *anura,* without tails; salamanders, with conspicuous tails, are *urodela.*

Experiment with a friend, at the museum or with pictures. Watch the quiet smile of surprise when he turns back to the animal or the bird, and tests the name point by point. Clams and snails are molluscs, because *molluscus,* soft, comes from *movilis,* movable. Inside each shell is an animal which yields to the slightest pressure. At the very word, you feel the soft little body in your hand.

The New York schools borrow specimens from the American Museum of Natural History. A few Latin students have worked out the names of some of these, and now the Editor of the *Nature Magazine* has given them an opportunity to do the same for certain of his illustrated articles the next month or two. Their contributions, made on the authority of dictionaries and Nature books will be found in the back pages. What they fail to discover perhaps some reader can supply.

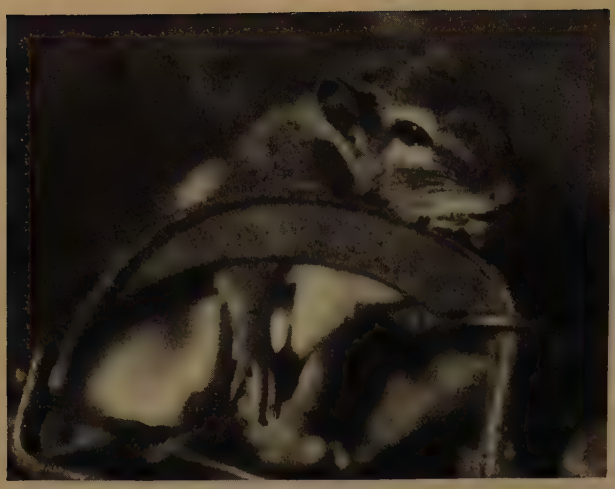
With the fascination of their search has come a new appreciation, in some slight degree, of the priceless legacy we have, in these words which have been coined by the scientists—by men who have been faithful observers of Nature, who have known their Greek and Latin and who have packed so much of truth into a single word or two. You, too, can derive pleasure from these scientific names by a bit of delving into their origins.

JAWS OF STEEL

A GLANCE BEHIND THE FUR COUNTER TO SEE WHAT IT REALLY HIDES

BY HUGH STERLING DAVIS

PHOTOGRAPHS BY THE AUTHOR



A GROUND SQUIRREL CAUGHT IN A TRAP

A TRAPPED WEASEL, SUFFERING AND FIGHTING

A COYOTE LOOKS UP, PLEADING FOR RELEASE

STAGGERING through the bitter storm toward two dim, snow-sheathed gleams of light, was the figure of a man. Just ahead of him, in a snug little trappers' cabin sat two other men, anxiously waiting for someone long overdue.

"For God's sake help me out of this trap!" pleaded the man as he flung himself through the door. "Toted it clean from Elk Creek. My arm's half squeezed off."

After the huge, twenty-five pound, spike-jawed bear trap was released by the use of special-made clamps, and his arm was bandaged as well as it could be, the victim told his story.

"The clamp broke when I had one spring down. I don't see how I got my arm 'tween the jaws, but there it was when those two death-irons bit. There I was, caught in my own set, the one I'd reckoned to get Old Scarface in. After wrigglin' around where I could reach the drag-log I cut the wire that bound the heavy chain, then picked up the trap and headed for camp. It got mighty heavy 'fore I got here and the pain was almost more than I could stand. It must be terrible torture for an animal in a steel trap, and I'm goin' to think twice before I set another."

This is an actual story as told to me by an old trapper in the Flat Tops of Colorado. All his life he had lived in the high mountains, trapping, hunting and prospecting. Many times he had been an eye witness to the tragedies caused by "jaws of steel". Yet he trapped the marten, weasel, fisher, mink and the coyote as he always had done; not for sport, because he did not feel that making animals suffer was sport, but for the scant living he could make from the sale of the pelts. Let us go the rounds of his trap line with him and see some of the sufferings that trapped animals must endure.

Each morning as we would trudge from trap to trap new stories had been written for us; written with blood and agony. Here the remains of a camprobber jay; there one still struggling for freedom; or yet another just alighting near the bait of a trap. Part of one bird we came upon still remained in the trap, the other was scattered on the snow where a bloodthirsty weasel had attacked it the previous night.

How cruel Nature seems among her wild folks. Yet how fierce man is without reason, and without thought.

These are not pretty pictures, nor is it a "pretty" story they illustrate. There are those who will say we should not publish either because they depict cruelty and suffering. If there are those who cannot look at these pictures and understand the meaning of the text they will have to turn on to other pages. We present this story and its illustrations because they concern facts we should face. And, in contrast to the depredations of the "death-irons" shown and discussed here, we will, in the February issue, publish an article by Vernon Bailey on humane traps

MANY BIRDS ARE THUS CAUGHT; HERE A MALLARD

Day in and day out we ran the trap lines. Each day brought new tragic scenes to us. The hardened trapper was used to seeing animals suffer so much that he did his work as he had for many trapping seasons. For two days we were forced to stay in the cabin because of an early winter snow storm. The trapper said there was no use to run the trap lines because the animals did not "run" during a storm. When finally we did run them, it was only to find dead, frozen, pain-racked animals in the traps. A porcupine had dragged himself, and trap, back under some down logs. Gaunt, almost dead, its foot was swollen twice normal size where the steel jaws had gripped. Finally death, after hours of painful suffering, would claim another innocent friend of the woodsman.

In a great grove of spruce and aspen, where the snow had scarcely sifted down to the forest floor, we found a screaming, fighting little ball of fur, the weasel, a fierce little demon of the woods.

On into another grove of trees we followed the trail of traps, then into an alpine park where a coyote set had been made. Now it was gone. We found this wild dog a cowering shy creature. For two days it had been imprisoned, struggling for freedom until its foot was almost twisted off; fighting to free its carefree, wild nature. A killer of sheep and young calves! Perhaps. But why use the torturing means of a steel trap?

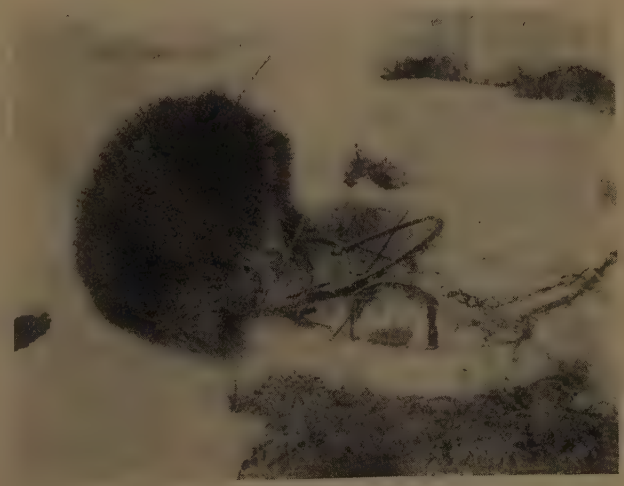
A NEEDLESS SACRIFICE ON THE TRAPPER'S LINE

Many a horrible death had been suffered by small animals and birds for which the trap had not been set. Much of the trappers' catch are creatures of no sale value.

Through dismal halls of towering spruce we made our way—dismal because of the death and agony we saw. How much better it would have been if the trail had lacked the traps, if we were not tearing frozen birds from the "irons", or facing eyes pleading for help.

In a little alpine meadow several traps had been set for water animals, such as mink and muskrat. Many a morning there would be wild ducks taken from the traps. Sometimes the foot would be all that was left. The jaws had broken the bone and the leg was twisted off. Once there was a hawk taken from a trap that was set a distance from the water.

Let those who do not know the story behind a piece of fur study these conditions, or go and see an animal that has been caught and held long in a steel trap.



A PORCUPINE, USELESS VICTIM OF A STEEL TRAP

WOOD-OF-THE-BOW

A TREE OF HISTORIC INTEREST AND ECONOMIC VALUE

BY ROSS E. HUTCHINS

THIS TREE IS LADEN WITH FRUIT

The Bois D'Arc often attains a height of sixty feet and its wood has been found useful as well as its bark

WHEN the first French settlers landed in Louisiana and began to push out into the unknown, they found many trees, plants and animals entirely new to them. For instance they found that the Osage Indians west of the Mississippi made their bows of a remarkable new wood. It was yellow in color and very hard and resilient, so they called it Bois D'Arc which means wood-of-the-bow. It is known in different localities by various names, some of which are: bow-wood, mock orange, bodock, yellow wood, Osage orange and hedge tree. To science it is known as *Toxylon pomiferum.*

The tree grows over a large area including Arkansas, Oklahoma, Alabama, Mississippi, Louisiana and Texas. It is most abundant in the valley of the Red River and thrives best in the prairie sections. In the old South it was used to mark off the boundaries of plantations, and these hedges are still present today. Hedges of Bois D'Arc are almost impenetrable due to the long spines on the branches which intermingle in such a fashion as to make one wonder how a bird can get through. The leaves are ovate-lanceolate with smooth edges, and are about three inches long. In spring they are a glossy green but when touched by the first frosts of autumn they become a clear yellow. The male and female flowers are like those of willow in that they are borne on separate trees, thus assuring cross-pollination. They are small, light-green and appear in early summer. The fruit is similar in size and shape to grapefruit and is produced in enormous quantities. It is woody inside and, sad to say, has no economic use. Some preliminary tests have shown that it contains about seventeen per cent of oils, but what these are and what use they would be is still to be discovered.

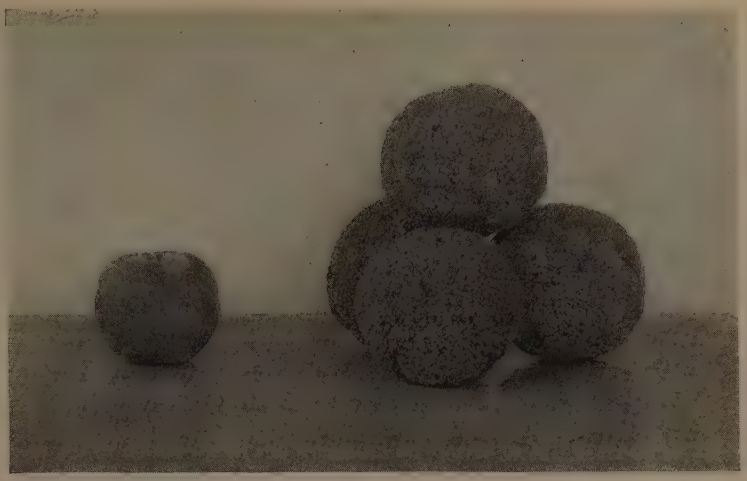
RIPE FRUIT ON A LIMB

As large as a grapefruit but as yet not known to have any commercial value

Although this interesting tree belongs to the same family as the mulberry and fig, it does not share their characteristically soft wood. It is exceptionally coarse grained, hard, heavy, strong and very durable. In contact with the ground it lasts almost forever and might aptly be called "the wood eternal." Due to its twisted grain it is difficult to work but is in great demand for use as wagon and vehicle stock, especially for felloes and for spokes, as well as for other specialized purposes such as fence posts and railway ties. The sapwood is lemon-yellow while the heart is orange. With age it becomes a rich chocolate color and even harder than before. It takes a beautiful polish.

Perhaps the greatest value of this tree lies in its use as a source of dye. Even the Indians made dyes from the root bark, and the early settlers used it on home-spun cloth. However, a very limited use was made of it until the World War. Since that time there has been an increasing demand for American dyes, and now it is coming into use as a substitute for fustic. The dyes found in the Bois D'Arc are morin or moric acid, and moritannic acid or maclurin. Imported fustic

contains these same things. The extract of this beautiful wood is now manufactured and sold under the trade name of Aurantine. When this dye is used with iron or chrome mordants it is fast to light, water and washing, especially when used on wools. It is also used on leather, wood, paper, and to a small extent on cotton, giving beautiful shades of orange-yellow, old gold, deep tan, olive and chocolate. It finds another use as a base for greens and grays when used in combination with other colors. It is claimed to be much cleaner, more uniform, yellower, faster and cheaper than imported forms.



FRUIT OF BOIS D'ARC AND AN APPLE
This gives an idea of relative sizes. The ripe fruit contains oils but as yet they have not proved useful

Thousands of tons of Bois D'Arc annually go to waste which might be used to produce dye. Altogether about 40,000 to 50,000 tons of waste are available yearly in Texas and Oklahoma alone. In 1915 about 14,000 tons of fustic were imported into this country. A few years later, after the War, this amount had dropped to one third and there is little doubt that the amount imported will steadily decrease as new methods of saving the waste wood from factories come into use. Thus this tree is another of Nature's gifts to the people of America.

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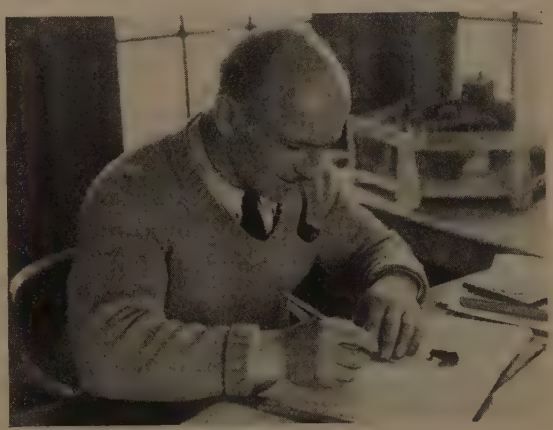
TOADS AS PETS

BY PAUL KIRSTEN

GRANDAD had not come to stay with me for a long time and he was most disgusted when I introduced him to my toads and called them pets. He shook his head when I told him I had raised thousands to work in the garden and greenhouse to keep the insects in check. "Pets!" he snorted, contemptuously, and turned away. But I found a pretext to get him to feed them later and kept half an eye on him. Before long he was



A TOAD STUDIES PENMANSHIP
At the left an aquarium equipped with an island home for the toad inmates

grinning and, finally, chuckling. For the rest of the visit I noticed he used to keep his reading chair facing the moss gardens where the toads made their home. And he fed them more than he should. Once I caught him holding his favorite in his hand talking to him.

So, you see, toads make friends of you—the essential quality in a pet. Starting with the little fellows as assistant gardeners I found it enjoyable to have some around the house. A wide dish or pan, partly filled with gravel spread over with some rich soil, some patches of living moss and here and there a small flower growing, and you have a toad home. A small dish filled with water must be included because toads bathe often. A little house of clay or wood gives the pets a place to retire to at night. Or, I have found that an island for the toads in the aquarium adds interest to that item of home adornment. The toads can swim and get along nicely with fishes.

Feeding these pets is no problem. They will eat about anything if it is small enough to be swallowed whole. Insects, of course, are best but they must be alive, or moved about so the toad can see them. Bits of meat are appreciated and softened crumbs of bread eagerly eaten. They need little care and are very hardy. I can readily recommend these little chaps. They are lots of real fun.

THE SUNDEW AT WORK

HERE we see the hungry sundew getting an insect meal. At the upper left the sticky tentacles of the plant catch and ensnare the prey. At the left the tentacles slowly fold over, forcing the insect to the center of the leaf. But the prey puts up a valiant struggle against disaster and almost escapes, at the lower left, being held up, however, by another set of tentacles. But the sundew is merciless. Again the insect is forced to the center of the leaf and held there while the leaf above folds its tentacles over the victim. Below, the meal has been ensnared and the insect is securely folded in. Now the plant sets to work to digest and to extract from the insect the nitrogenous matter not found in the water in which the roots grow. Thus has Paul L. Miller of Seattle, Washington, caught and recorded the methods of one of this most interesting group of insectivorous plants.

ACORN BARNACLES

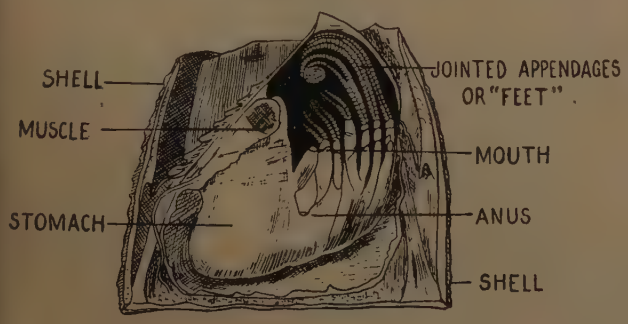
BY P. A. MORRIS

THE acorn barnacle has been aptly described as an animal that rests on its head and kicks food into its mouth. They are familiar to everyone who visits the seacoast as the hard sharp objects that cover the seaward side of rocks and boulders near high water mark. For many years they were considered mollusks, but were finally rightfully placed among the crustaceans, as relatives of the crabs and lobsters.

The adult animal is enclosed in a shell formed of six limy plates arranged in a circle, suggesting the cup of an acorn. This skeletal ring is roofed over by four more plates which make up a sort of trap door, by means of which they can shut themselves up completely in their shells. A characteristic sound of the rocky seacoast is the peculiar hiss produced by countless thousands of barnacles closing their valves as one walks over the rocks.

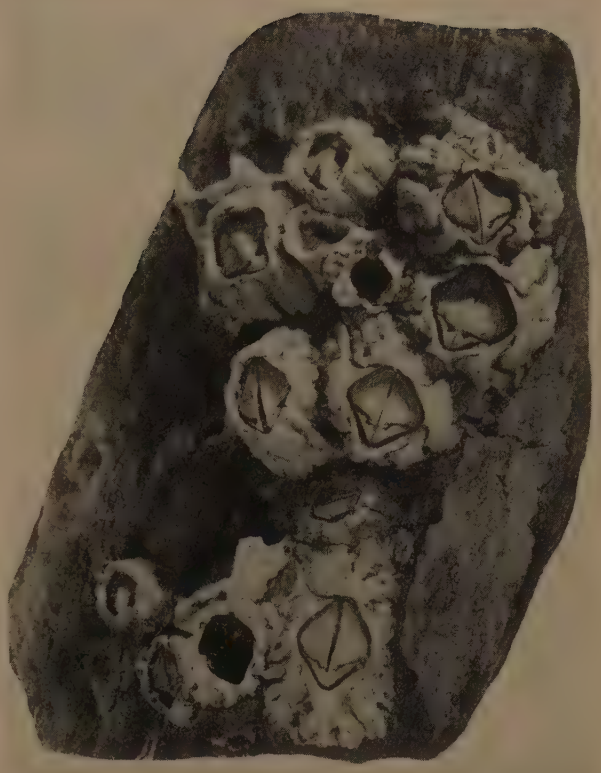
When first hatched the little barnacle is a tiny, free-swimming organism, which soon molts and assumes a second larval stage, protected by a thin transparent bivalve shell, something like that of a clam. At this time the youngsters swim about freely, and may be seen in dense swarms about the rocks and in tide-pools along shore. In Long Island Sound they may be found in February, the young barnacles looking like tiny brown seeds as they dart jerkily here and there in the water. After a few days they settle down and attach themselves by their heads to some hard object. The antennae, with their associated cement glands, aid in the fixation. They then undergo a process of metamorphism, and the adult, permanently fixed barnacle as we know it results.

In feeding, the animal protrudes its "feet", which are plume-like, jointed appendages, through the trap door and waves them frantically about, creating a current of



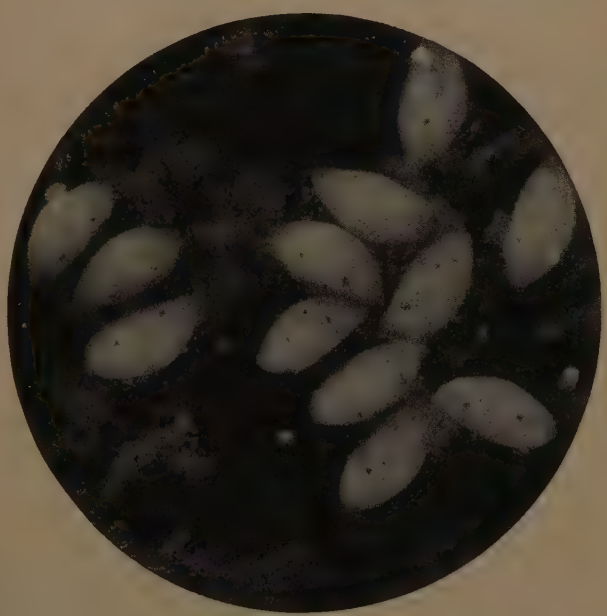
sea water down into the shell cavity, carrying with it microscopic food particles to the mouth.

This can easily be watched by placing a bit of rock or shell with a few barnacles on it in an aquarium containing sea water, and scattering a teaspoonful of clam broth over the surface. The barnacles will soon respond.

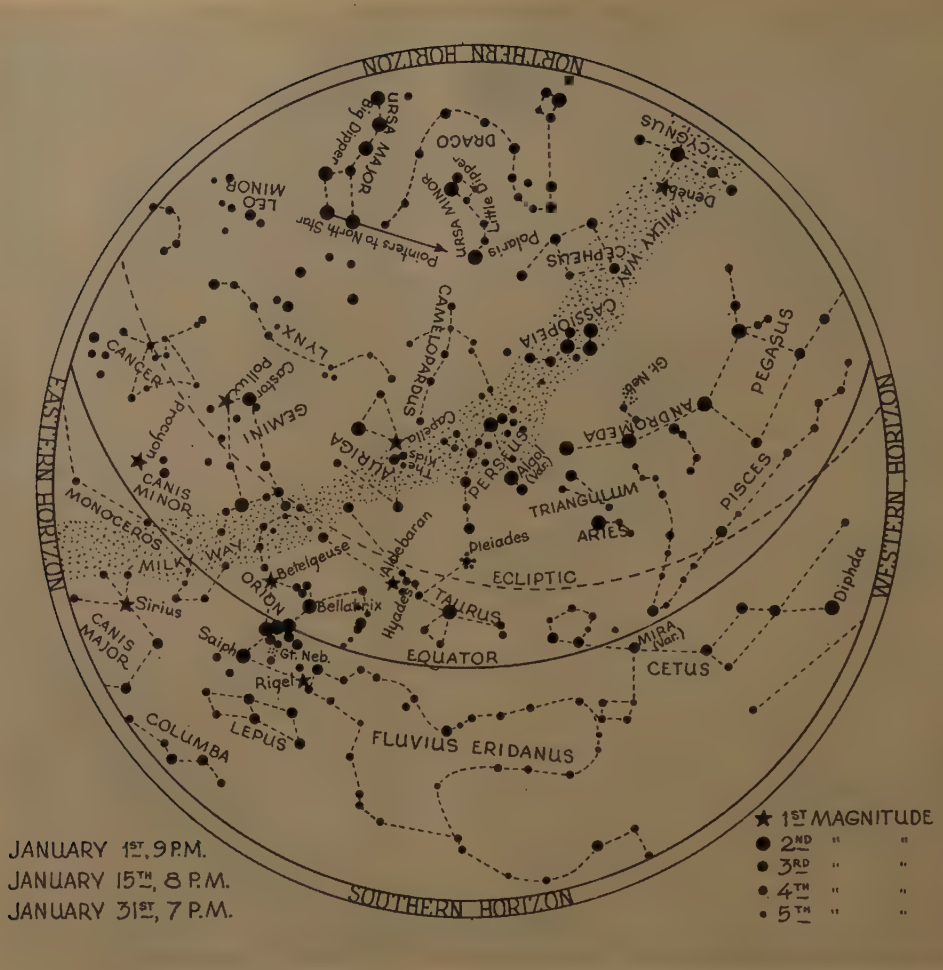


THE FAMILIAR CLUSTER OF BARNACLES

Below, the free-swimming stage with the eye-spots plainly seen. At the left, the diagram of the living parts of the animal



We had originally scheduled the article by August Pohndorf, Jr., author of our recent birthstone series, on gem stones of the Rockies for this issue but last minute changes in schedule made it necessary to postpone the article until the February number. You will be surprised to learn of the variety of gems to be found in our own West and to read of their discovery.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

THE SPLENDORS OF ORION

BY ISABEL M. LEWIS

ORION, known variously as The Warrior, The Giant, and The Hunter, well deserves its reputation of being the finest constellation in the heavens. The westernmost star of the three that form the characteristic Belt of Orion lies almost exactly on the celestial equator and therefore the constellation is visible from all parts of the world, except that, at the north pole, only the portion north of the Belt, and, at the south pole, only the portion south of the Belt, may be seen. In the mid-latitudes of both hemispheres and particularly in the tropics Orion is a magnificent object, although to the observer south of the equator he always appear in topsyturvy position with his head toward the horizon and feet toward the zenith. Rising in the east about nine P. M. early in November, Orion may be seen in the evening hours until it disappears in the rays of the setting sun in May. In January it may be seen practically throughout the night.

The huge quadrilateral that outlines the body of Orion has at its northeastern corner the reddish star of first magnitude, Betelgeuze. This star marks the right shoulder of Orion and the word is Arabic for armpit. Betelgeuze is a reddish star, variable irregularly in light. It is a giant star, the first to have its diameter measured by the interferometer, great enough in size nearly to fill the orbit of Mars if placed at the center of the solar system since its diameter is approximately 250,000,000 miles. Its mass is only about fifty times that of our sun so its density is only one-thousandth that of air! It is a comparatively cool star with a surface temperature of about 9000 degrees Fahrenheit. Its peculiar variability of light may be connected with the fact that it is a multiple star system with one companion so close that it cannot be seen telescopically. The distance of Betelgeuze from the earth is about 190 light years and it is not a true Orion star.

All of the brightest stars in Orion, with the exception of Betelgeuze, form one enormous group at a distance from the solar system so great that the light of the individual stars takes six centuries or more to travel to the

earth at the speed of 186,000 miles per second. The stars of the Orion group are all excessively hot bodies, bluish-white in color and of the type known to astronomers as helium, type B, or Orion-type, because so many of the stars of this type are found in this constellation.

Closely associated with these stars of the Orion group is a great nebulous region that entirely envelopes the constellation in its fainter streamers and extensions. The heart of this vast nebulosity is the Great Orion Nebula which is the most beautiful object of its kind in the heavens. It may be seen with the naked eye on a moonless night as a hazy patch in the Sword of Orion which extends southward from the easternmost star in the Belt. The lowest star in the Sword is a double star of third magnitude and the star directly above it, known as Theta, lies in the midst of the great nebula and is undoubtedly closely associated with it and an exciting cause of its peculiar greenish light.

Theta is a star made up of six components bright enough to be seen in a moderate sized telescope and there are, in addition, three more extremely faint stars in the system. The four brightest stars form the well-known trapezium that may be seen in photographs of the Great Nebula. Even with a field glass this region becomes a remarkable sight. The greenish tinge of the great gaseous nebula is more noticeable, and stars unseen before are revealed. Yet one needs a powerful telescope to bring out the magnificence of this region which lies in the heart of the vast nebula that extends throughout the entire constellation. The distance of the Great Nebula is 650 light years and its diameter is about five or six light years or between thirty and thirty-six trillion miles. Gaseous nebulae of this kind apparently consist of clouds or streams of cosmic matter, possibly in the form chiefly of finely-divided particles that are in chaotic motion. Normally these nebulae are dark clouds opaque to light obscuring the light of stars beyond them, but when they are associated with excessively hot stars, such as these Orion stars are known to be, the radiations from the stars excite certain gases in the nebula—in particular oxygen, nitrogen, and helium—to incandescence. This is the cause of the peculiar greenish light of such nebula. A star has to be very hot before it can excite this radiation in these ordinarily dark cosmic clouds. The hotter the star the greener the light of the associated nebula. When the star is moderately hot the nebula shines only by reflected light from the star. When it is very hot its radiation in some manner sets up an emission of light of one color from certain atoms of gas, generally hydrogen, oxygen and nitrogen, that are present in these cosmic clouds. Photographs of different regions in the constellation of Orion show not only bright nebulous clouds but also dark ones projected against a bright background thickly studded with stars. Even in the midst of the Great Nebula dark nebulosity appears in the form of dark streaks, and just above the easternmost star in the Belt of Orion is the noted Dark Bay nebula which consists of dark obscuring matter in the form of a great cosmic cloud encroaching upon a field of faint stars.

Many of the Orion stars form double, triple or multiple systems. In fact single stars are the exception rather than the rule in this constellation. For one with a good field glass or small telescope Orion is a treasure mine of interesting objects. By far the finest of all the stars of the Orion group is the magnificent Rigel, which is the bluish-white star diagonally opposite Betelgeuze in the great quadrilateral. Rigel has a companion star so close that the two cannot be seen as separate stars even in the most powerful telescopes, although the bright star is suspected of appearing elongated at times. The two stars are believed to have a shorter period of rotation about their common center of gravity than any other known system.

Rigel is about seventeen million miles in diameter and it is equal in brightness to the combined light of thirteen thousand suns as bright as our own. It is one of the hottest stars with a temperature of about 29,000 degrees Fahrenheit as compared with a temperature of 9000 degrees for the low temperature star, Betelgeuze. The relative temperature of these stars is indicated by their color, the cooler star being red and the high temperature star a bluish-white. The two remaining stars in the great quadrilateral are Bellatrix, in the northwest corner, in the left shoulder of Orion, and Saiph diagonally opposite in the southeast corner, which marks the position of the right knee of Orion, while Rigel is in the left foot. Saiph, known also as Kappa Orionis, is a star of second magnitude, as is also Bellatrix and the three stars in the belt known from west to east by the Greek letters Delta, Epsilon, and Zeta. Above the quadrilateral of bright stars and approximately midway between Betelgeuze and Bellatrix is a group of three faint stars that mark the head of Orion. There is also a line of stars of third and fourth magnitude some distance to the west of Bellatrix in a vertical line representing the lion's skin thrown over the left arm. The line of stars running upward from Betelgeuze and then westward represents the uplifted right arm holding the club with which Orion is threatening Taurus.

The constellation of Orion, in addition to containing the finest gaseous nebula, two of the most remarkable stars, and a host of interesting double, triple and multiple stars, furnishes us with a most convenient measure for estimating angular distances in the heavens in the form of its strikingly beautiful and conspicuous Belt which is very close to three degrees in extent. Moreover, in Orion we find stars representative of the standard stellar magnitudes that may prove helpful to us in estimating the brightness of other stars. Zeta Orionis, the star farthest east in the Belt is exactly of the second magnitude, while Delta the farthest west of the three stars is half a magnitude fainter, or of two and one-half magnitude. Rigel is brighter than a star of standard first magnitude but somewhat fainter than a star of zero magnitude being estimated to be of 0.3 magnitude. Betelgeuze, which is variable in brightness, ranges irregularly from a star of 0.5 magnitude, when it is slightly inferior to Rigel in brightness, to a star of standard first magnitude. It will be interesting to see if (Continued on page 48)

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MANY WORMS WERE DUG FROM THE GARDEN FOR JIM CROW BUT HE HAD AN APPETITE TOO GREAT TO SATISFY

JIM—THE TEA PARTY CROW

BY MARION STAPLES HALLER

PHOTOGRAPHS BY THE AUTHOR

YOUNG Jim Crow first joined the children as they gathered for an afternoon tea party of cookies and grape juice in a shady corner of the garden. Where the black youngster had come from, and how, was a mystery. Why he had come was plain from his hungry squawks!

Amused and yet a bit alarmed by their noisy visitor, the children started toward the house for mother. They felt they needed support and advice about feeding this uninvited guest. They looked very funny to mother as they trailed across the lawn, each with a glass and cookie, followed by the baby crow. Like the young bird he was, although he was almost grown up, the visitor was fluttering his great wings. And, between squawks, he threw back his head with his big mouth wide open, ready for food.

What to offer the hungry guest was a bit of a problem. The cookies generously offered by the children did not please the crow. Earthworms seemed a better idea. So the tea party group went into the garden. Digging was rewarded by some fine worms. The satisfied gulps of the guest as these were placed in his craw showed what he liked.

JIM ACTING LIKE A GENTLE DOVE. PERCHING ON A FRIENDLY ARM PLEASED HIM WHEN IN THE MOOD

But when half an hour of digging for worms had made no change in Jim Crow's appetite there was a loss of enthusiasm.

Then mother remembered that in playing parent to baby robins, bread and milk had proved an easy solution to the feeding problem. Jim Crow thought this a fine idea, too. He gulped the dripping pieces of soaked bread until finally, and to the surprise of all, he had filled himself.

In order to protect the new guest from prowling cats or dogs, he was put in the screened summer house. There he made himself at home, perching on one of the children's small chairs for a peaceful after-dinner nap. From then on, every two hours, Jim Crow set up a very noisy demand for food.

The large summer house remained Jim's place for safety and slumber, but the garden and lawn were where he had adventures. He waddled about having battles with the nodding flowers in the garden, hiding the children's spoons and small toys in the sand pile, and, finally, pulling up some of the best seedlings in the flower border! To stop him from doing such things in neighbors' gardens and to keep Jim from holding up traffic by parading in the road that passed the house, he was tied with a light, strong cord about his leg. This did not bother him by getting tangled or stopping him with a jerk. Jim liked to walk instead of to fly, and a smooth lawn gave him a fine place to explore. He seemed to think his leash was another plaything.

One day a small radio was taken to the summer house to cheer the family as they weeded the garden. Jim was fascinated. He walked up to the machine with some doubt. His head was cocked on one side. When he was sure that this was harmless, he flapped his wings and flew to its peak. There he settled himself for a concert. Each time a piece ended, Jim croaked his applause. The radio announcer puz-

WHEN WORMS GAVE OUT JIM WAS HAPPY WITH A DIET OF SOAKED PIECES OF BREAD. THESE HE ATE HUNGRILY

zled him, however. He would slyly peep over the top edge of the radio when he was speaking. It looked as though he hoped to catch sight of this speaker who, strangely, he could not see. After this first tuneful hour on the radio, Jim always flew to it as a perch whenever there was music.

Although he had no crow mother to teach him how to get food for himself, Jim soon was expert at catching bugs and beetles to add to his regular meals. Daily the great wings grew stronger. They carried him on longer and longer flights. In such a few days Jim Crow was a grown-up bird!

In spite of the delight this pet bird showed in being with humans, he was truly lonely for his kinfolk and a freer life. Since he had come to us we had learned that a pair of crows were raising a family in a woods half a mile away. Possibly our Jim had wandered that far.

So the children started for the woods one morning, with Jim Crow and mother bringing up the rear. As we came to the cool, shaded paths in the deep woods, our feathered pet struggled for freedom, but the crows' nest was still some distance away.

Suddenly there was a noise among the branches above our heads, then a flapping and startling "CAW-AW-AW". At the call, Jim grew rigid. Then he gave forth such a terrifying series of squawks that it was hard to believe he was not being murdered! The great bird above us swooped, and as she did so Jim was gently tossed to freedom and his kin. Thus launched, he soared and met the swooping bird. Together they rose to the upper branches of the tall tree above us. Three other crows, one old one and two the size of Jim, came cawing to the scene of excitement. There in the tree top they seemed to hold a family reunion.

As we turned to go, sure that Jim was welcomed home, we heard a familiar squawk. Our spoiled pet was demanding food! Then two other young crow voices joined in the "hungry song", making a strange and noisy trio. Two crow parents rose at the demand and flapped off in search of food.

We laughed as we wandered through the fragrant woods, thinking of Jim Crow's funny pranks. And because, of our own free will, we had chosen to give him his freedom, we were happy.

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DON'T "WHIP-POOR-WILL!"

By FLORENCE H. MOORE

"*Whip*-Poor-Will! *Whip*-Poor-Will!"
But why, may we ask,
Should anyone tell us
To perform such a task?

The dark woods won't tell—
Are they "blind as a bat,"
To the secret of who
Whips poor Will like that?

So we won't "*Whip*-Poor-Will,"
For when day songsters rest,
This night bard of the woodlands
Gaily comes as our guest.

PUZZLE: Find the other Whip-Poor-Will, also Bobbie, who is imitating his call.

THE GHOST CRAB

By Phoebe Knappen

uring a recent sojourn at Virginia
h, Virginia, from May 23 through May
onsiderable information was gathered
rning the habits and food of the swift-
ing ghost crab, *Ocypoda albicans,* which
ly resembles a stage coach in outline.
ese crabs spend most of the day in
xcavation of tunnels, of which many
more than a foot in length and tor-
s, some having two entrances. In *The
Beach at Ebb Tide,* Miss Arnold refers
. . the holes, often three feet deep, dug
ndicularly into the sand." None of the
ows observed in the vicinity of Vir-
Beach were perpendicular, on the
ary most of them made an angle be-
n 45° and 85° with the surface of the
the opening being nearer the ocean.
crab removes the damp sand from the
el in the pocket formed when the larger
is held close to its body, the other
being used in climbing out. When the
is sufficiently far from the hole, the
is projected on the dump with a
ning-like motion as the crab reverses
irection, returning to the mouth of the
ow, where it may remain for some time,
eying the terrain. Averages from the
ng of several diggers showed that thirty-
seconds were consumed from the
ent of disappearance into the hole till
pearance with a load of sand, while five
nds were required to convey the sand
e dump, dispose of it, and return to the
Either the left or right chela (more
uently the left, in those noted) was con-
ably larger—longer and broader—than
other. In descending into the hole the
having the larger chela is lowered first,
this is likewise the side that emerges
Food carried to the tunnel is held
sed to the body by the larger chela.
htened crabs fled indiscriminately to
ows or to the ocean for protection.
ugh most of the burrows are situated
e the tide-washed area, many small bur-
s are found below the high tide mark.
n May 23 and 24 great numbers of
least four species of dragon-flies were
d flying all about the beach, feeding
to the surf and sand as well as in
upper air. On May 24 a night patrol
a flashlight revealed hundreds of
usted and dead dragon-flies lying on
sand at the edge of the incoming tide,
re various other invertebrates were feed-
on them. Most notable among the preda-
were the ghost crabs, which, holding
dragon-flies by the outspread wings,
wed at the head and thorax of the
er species but engulfed the whole of
ller species. In addition to the Odonata,
y water-logged Tipulidae were con-
ed. These observations led to further
y of the crabs, which were found to
feeding also on the little crustacean,
"sand-bug", *Hippa talpoides,* taking
imens up to two-thirds of an inch in
th. Diurnal observations on May 25
firmed this feeding habit, and that night,
n few dragon-flies were to be found
the sand, the crabs were feeding prin-
lly on this small crustacean. After dig-
g up the "sand-bugs" at the edge of the
or even under the water, the crabs
ied them to the sand above the water's
e, or to the burrows, before eating. The
ppa is held in front of the mouth with the ventral portion toward the crab, which proceeds to eat the appendages and soft parts, discarding the cleaned carapace. On the night of February 25 a sand-crab was watched for several minutes chewing at the tail of a six-inch fish cast up by the tide.

About a block back from the shore-line a concrete road is laid across the sand parallel to the beach. During day driving on this road—both morning and afternoon—very few ghost crabs were observed, but after dark the road was always well dotted with them. This confirms the belief that the ghost crab is largely nocturnal in habit.

SQUIRREL SWIMMERS

By C. B. Olds

Several years ago when rowing down a northern New York lake for an afternoon of bass fishing I was attracted by a wake on the fairly still water. The lake is about fifteen miles long and from one-half to three miles in width. At this particular point, however, it is only about two hundred yards wide. At first I concluded that the ripple was made by a muskrat but on approaching nearer I was surprised to find that it was a gray squirrel. Without extra effort I was able to meet the squirrel at about the middle of the channel. The animal was not to be driven from his course but came steadily toward the boat. I ceased rowing, leaving the oars in the water, and considered what his next move would be. Apparently the squirrel preferred to take advantage of solid footing because he scrambled up the oar, around the edge and stern of the boat, out on the other oar and into the water again and continued on his way across. This unusual spectacle convinced me that squirrels can and do swim even when not compelled to do so. On the following day at about the same hour I had the same experience except that my friend turned back to the shore instead of coming aboard. I concluded that he was crossing for nuts which were plentiful on the north shore.

BLACKBIRD SENSE

By Elsie M. Long

Who can believe that the perky blackbird strutting the lawn, trim as a priest in his ebony coat, is capable of reasoning? Yet deductions made from observation would indicate that he sometimes "puts two and two together."

My writer's retreat is in the glorious foothills of the Sierra Madre Mountains. In the back yard terraces of mesembryanthemum spill their amethyst gems down to bejewel the edge of the little mesa reserved for the birds as their feeding ground.

Here I have placed a round cement plaque that can be hosed off. This serves as a table for bread crumbs and soft foods. A large shallow granite pan holds the water for a bath. Many varieties of wild birds, including three ring-necked doves, come morning and evening for the chicken scratch that I scatter on the clean-swept dirt floor of the mesa.

A row of giant eucalyptuses on the rear boundary of the lot provides the birds with a choir loft where hymns of gratitude are poured forth. The old olive trees that flank the garden are used as observation towers by the timid creatures when they fly down from the loftier trees to watch me spread their table. As soon as I turn away I hear the rush of wings that announces their presence at the feast.

From my kitchen window I can observe their movements with perfect freedom; and it was from this very vantage point that I learned only last week that Mr. Blackbird THINKS . . . REASONS . . . REFLECTS.

A little blackbird stood alone on the edge of the water pan. His little legs were wide apart as though he were making a conscious effort to brace himself. He held a large piece of dry bread in his bill. I saw him hesitate a minute, and then deliberately drop it into the water.

Because his movements gave indication that he was conscious of what he was doing my curiosity was aroused. I watched him with interest.

Mr. Blackbird waited a minute with his attention fastened on the morsel, and then deliberately fished it out of the water. The bread had been baked bone dry by the sun or it would have been too soft for him to rescue. He seemed to know just how long to leave it in the water. After tucking the piece carefully under his foot, he proceeded to eat the outer softened portion.

Finding the core still dry, the bird deliberately dropped it again into the water. Never taking his eye from it he waited a minute and again picked it up with his bill. I could not believe my eyes. I was thrilled with admiration for the bird's obvious intelligence. Mentally I exclaimed, "That bird isn't so dumb after all." Leaning on the window sill, I watched breathlessly. He repeated the performance more than half a dozen times—until the morsel was completely consumed.

This delightful creature, classed with the "dumb" things of creation, had actually discovered the softening power of water. If that isn't power to reason, I don't know what is.

I had formerly believed that the saucy jay was the wisest bird among my garden guests; but I know what the jay would do with sun-baked bread. He would carry it to the garden hose on which he loves to stand. There with it pinned firmly under his left foot, he would peck it vigorously, letting the bits fly in every direction. He would continue till the crust was totally wrecked. Then he would jump wildly about to recover the bits, viciously attacking any bird that dared to glean a crumb. He would scold and gulp because the dry bread scratched his greedy throat. Finally he would gallop off to the pan for a drink. But this wise little blackbird in the shiny frock coat is a "dunker".

Game Increases

Census of big game animals in National Forest areas reveal an increase in most instances between 1930 counts and estimates and those of 1932. Antelope, black and brown bear, grizzlies, deer and elk all show increases. In some sections deer increases have been so considerable as to threaten food shortages and brief open seasons have been declared. Moose show virtually no increase and there is a slight decrease in the number of mountain goats and mountain sheep.

THE SPLENDORS OF ORION

(Continued from page 43)

one can detect the light variations of this star from time to time.

The small star, Iota, at the bottom of the Sword of Orion is almost exactly of the third magnitude. Directly above Rigel is a little star, Tau Orionis, that is a little brighter than a standard fourth magnitude star. The brightest star of the three that mark the head of Orion is also slightly brighter than a fourth magnitude star. To show how greatly everyone overestimates the magnitude of the moon's disk attention is sometimes called to the fact that the moon could be inserted within the small triangle formed by these three stars in the head of Orion, the space that the moon fills in the sky, as viewed from the earth, being less than the area of this small triangle in spite of the fact that the unscientific observer compares it to a "dinner plate" in size!

Below Orion is the small constellation of Lepus, The Hare, a small compact little group of third and fourth magnitude stars, and below Lepus is another small constellation, Columba, The Dove, which contains two stars that are slightly brighter than the third magnitude. These two groups lie directly west of the fine constellation of Canis Major, The Greater Dog, which contains the magnificent Dog-Star, Sirius. To the northeast of Sirius is Procyon, The Little Dog-Star, in Canis Minor, both following close upon the heels of Orion as he strides across the heavens.

Fluvius Eridanus, The Sky-River, which flows into the southern hemisphere and ends its course far below the southern horizon at the beautiful bluish-white star, Achernar, which is only slightly less brilliant than Rigel, passes close to this brilliant star in Orion before turning its course southward. Eridanus at this time fills most of the southern sky with its stream of faint stars below Taurus and west of Rigel, Lepus and Columba.

We need scarcely call attention this month to the fine constellations of Auriga, Perseus, Taurus and Gemini, now so conspicuously in view. Cassiopeia also is high in the heavens at this time while Andromeda and Pegasus have passed to the western sky and Ursa Major is low in the northeast. At this time of year the Big Dipper lies close to the northern horizon, in the early evening.

Venus is a magnificent object in the evening sky the first of this month. It attained its greatest brilliancy the last day of the year and the first of January sets about three hours after the sun. Its distance above the horizon at sunset will decrease gradually during the month and before the end of the month it will be lost to view in the rays of the setting sun.

Jupiter is now high in the eastern sky at sunrise. On January 13 it will be in quadrature or ninety degrees west of the sun and on the meridian due south at sunrise. After that date it will rise in the east before midnight.

Mars is still in the western sky but disappears in the twilight before the month is over. Mercury comes into superior conjunction with the sun on January 20 and is not visible this month. Saturn is still in the western sky but is so close to the sun that it also disappears from view this month. It will be in conjunction with the moon on January 16 and on the following day will be in conjunction with Mars, the two appearing almost as a double star low in the southwest in the twilight.

There will be a partial eclipse of the moon on January 30 but only one-tenth of the moon's diameter will be covered by the shadow of the earth at greatest eclipse. The eclipse will be visible only in the northwestern part of North America, the Arctic, Pacific and Indian Oceans, Australia, Asia, and parts of Europe and Africa.

Here Are the Scientific Names

If you have read Miss Prescott's article on Page 35 you know the reason for what follows. These are analyses of the meaning and origin of the names given by scientists to the chickadee (Page 10), the mountain spleenwort (Page 13) and the Osage orange (Page 38). These analyses were prepared by the members of the Junior Science Club of the Latin Department of the Abraham Lincoln High School in Brooklyn, New York. In addition to those whose names are signed to the three items that follow, Abraham Schwartz, Norman Lobel and Jack Kansky contributed much time in research. We should appreciate the opinion of our readers as to the value of such a feature as this.

THE CHICKADEE, *Penthestes atricapillus.* The common name chickadee is in imitation of the bird's call. In the Chippewa Indian language the bird is called *Kitch-i-kitch-i-ga'-ne-shi*; but to American ears he seems to call, *Chick-a-chick-a-dee'-dee-dee.*

The chickadee calls his name as he gathers food. The Greek word *penthes* means mourner, and *hestes* means joyous. Since he has various calls in the minor key, and because he seems to chatter a cheery note, he is named *penthestes.*

Atri is Latin and means black. *Capillus,* which is Latin, means hair. The chickadee has black feathers (hair) down to the nape of his neck, as a person has his hair down to the nape of his neck.

He belongs to the titmouse family. *Tit,* meaning bird, is probably imitative of his call; *mase,* which is Anglo-Saxon, means a small bird. The chickadee is also called *Parus atricapillus,* and is one of the family of *Paridae. Parus* is connected with *parvus,* Latin for small.

Atrament is the black fluid which the cuttlefish throws out to darken the water and to insure his escape from would-be killers. *Capillary* is derived from the Latin word *capillus.* Capillaries are hair-like blood vessels which receive the blood from the arteries and send it to the veins.

Therefore, whenever you see a chickadee, remember these things. He has black feathers down to the back of his neck; he speaks his name chickadee; he is a small bird and has calls in the minor key and cheery calls.

HENRY HILSENROTH.

THE MOUNTAIN SPLEENWORT—*Asplenium montanum.* If you should hear your family doctor mention the organ spleen, think of a melancholy or morose person, who looks at the sour side of life, through smoked spectacles. According to an ancient belief, the spleen, a gland at the left of the stomach, was supposed to be the seat of all passions and ill temper. The mountain spleenwort was used by the quack doctors of yore to cure splenic disorders.

The common name is derived from an Anglo-Saxon word, *wyrt,* meaning plant or root. The scientific name comes from the Greek *asplenion* and Latin *asplenium* which referred to the same plant. *Montanum* is Latin, and means "living in the mountains."

The leaves of ferns are called fronds, from Latin *frond*—, leaf; those of the mountain spleenwort are ovate-lanceolate. Derived from the Latin *ovatus,* which means egg-shaped, ovate in botany means that the leaf has a base broader than the apex. In botanical terms, lanceolate (Latin *lanceola,* small spear) means the leaves are tapering, and shaped like a spearhead.

Every living thing, plants included, has a past. Witness that of the mountain spleenwort.

AUGUST TURCO.

OSAGE ORANGE—*Toxylon pomiferum.* The Osage orange tree is found near the Osage River, which flows through Kansas and Missouri. In Indian language Osage means "those who camped." The orange is a delusion and a snare, being only a globular, yellowish green mass, not at all edible.

The scientific name for this tree is *Toxylon pomiferum. Toxylon,* perhaps a short form for *toxoxylon,* is derived from Greek *toxon,* bow, and *xylon,* wood. The wood of this tree was used by the Indians for bows, hence the name *Toxylon;* it was called by the French settlers *bois d'arc,* bowwood. *Pomiferum,* derived from Latin *pomum,* apple or fruit, and *ferre,* to bear, means bearing apples, or fruit similar to apples.

From these scientific words are derived many familiar English words. From the root *toxon* we have the word *toxophilite,* a name given to a lover of archery, and *Toxodonts,* prehistoric animals named because their molar teeth were curved like bows.

Xylon, wood, gives us *xylem,* woody tissue of plants, and *xylophone,* a musical instrument made of wooden bars which are struck with mallets.

From the Greek myth about Ceres and Proserpina we are acquainted with the *pomegranate,* from *pomum,* apple, an apple-like fruit with many seeds or grains. In French the word for potatoes is *pommes de terre,* apples of the earth.

And so, when you who live in Kansas see an Osage orange tree, perhaps you will remember that its fruit resembles apples or oranges and its elastic wood is used for making bows.

LILLIAN SCHWARTZ.

World Reptiles

Reptiles of the World by Raymond L. Ditmars has for some years been the standard text for study in this field. Its scientific nomenclature, however, has gradually become out of date and classifications have been changed. The author felt that the time had come to bring the volume up to date in the light of increased knowledge and study of the reptile world. There has, therefore, just issued from the presses of the Macmillan Company a new and revised edition, being the last word on world reptiles. There are some two hundred illustrations in this edition. The book sells for five dollars.

GARDENS AND GARDENING

Edited by

ROMAINE B. WARE

en though outdoor garden activities are, any places, practically at a standstill, is the time to plan for next year's gar- Soon the new seed catalogs will begin rive. At this season we should look ward upon the garden of 1933, and plan ovements.

friend with whom I was talking the day told me with pride how his roses most of the prizes at the local flower . Early in the spring he gave them a y dressing of barnyard manure and cut back severely. He cultivated every week, er if there were showers, and, when a pell threatened, he irrigated. The result a wonderful crop of fine blooms and y all the blue ribbons. This year he is ng two dozen fine new varieties and s to repeat his winnings.

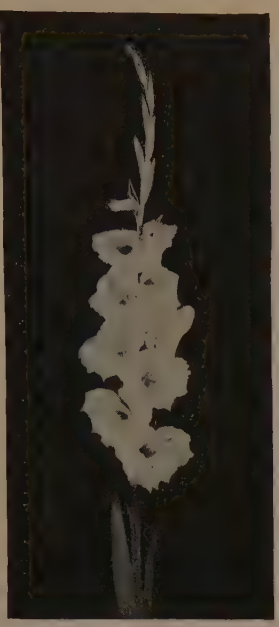
ch year more and more flower shows eld, and those who exhibit enjoy some e greatest joys of gardening. Some years a neighbor of mine determined to make ord in the fall flower show and at the fair. His plans began taking shape in ary. He had a vacant lot garden, and a few dollars spent for seed planted a variety of things. Not only did he y their care and the satisfaction of see- them grow but from midsummer on was a wealth of cut flowers for the e and to give away to friends. His hardy efs were especially colorful in the fall use, realizing the difficulties of good m at that time, he planned accordingly. hen the local show date arrived he was to enter nearly every class. He exhibited e than one hundred kinds of annual and nnial flowers and had sufficient mate- to select from to pick quality blooms in y case. Naturally the prizes came his At the county fair he took many blue ons, all because of planning in advance then working to make the plans come

hile visiting around last fall I was h impressed with the wonderful im- ement in roses. At the Conard-Pyle nur- I saw a new rose, "Luis Brinas," with ge-copper buds opening to a soft old flushed with gold. The bush was vig- s with excellent foliage and is claimed e the most free blooming rose they have grown. With the great popularity of e orange-copper tones in roses, it is safe predict a wonderful future for Luis as.

planning new things for your garden t overlook the "Ile de France" Buddleia. s is a greatly improved form of the but- y bush, growing much more symmetri- and only three or four feet tall.

ave you a spot in your garden where a form or standard wisteria would add a hing touch? They are ideal for garden nt or at the corner of a terrace. As these ts are scarce and difficult to produce, are never cheap but, once planted, make r to be forgotten pictures.

ave you overlooked the dwarf and trail- shrubs for your rock garden? Some of n are especially delightful. Recent years e seen the introduction of some charming



Grow Gladiolus

No summer flowering bulb will give so much pleasure with so little work as the gladiolus. There is something about growing them that "gets you" as no other flower does. Illustrative of this the following paragraph which has appeared in my catalog for the past few years has caused so much comment that it has become a classic.

"There is a fascination about growing glads that becomes a hobby, then a craze. There are five stages of interest in growing "glads". First you just grow them as an amateur, same as you would any other flower. Then as your interest in them increases you become a "fan," then a "bug," then a "nut," then finally a "fiend." When you reach this final stage you are hopeless. You think of "glads" all day, dream of them at night, spend every available minute of your time in the garden, talk of them, visit the shows, read all the catalogs and spend all your money on them. You will look lovingly at the last flower in the fall, will handle over your bulbs in the winter time and will hardly be able to wait till you can lovingly plant the bulbs in the spring. From then till the first bloom appears is a period of happy anticipation. When finally the spikes of bloom begin to appear you are in heaven."

Many people write me telling me the stage they are in now. It is no wonder people enthuse about gladiolus so much as there is an almost infinite variety of colorings, forms, etc. to choose from, many of them being exquisitely beautiful. If you have even a very small spot in your garden that you can spare *try gladiolus this year.* You will be tremendously well repaid with their beauty.

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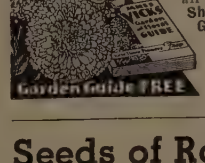

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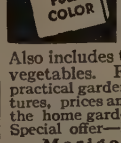

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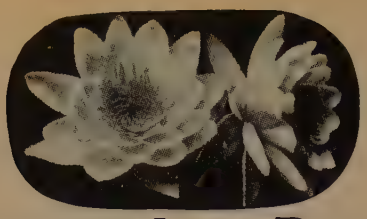

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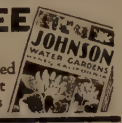

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cotoneasters and barberries, many of them evergreen. There are several brooms that stay less than a foot tall and bloom profusely in June when color is much needed in the rock garden.

One of the true gems among shrubs for the rock garden is the garland flower. Growing but eight to twelve inches tall, it produces a mass of delicately perfumed rose-pink blossoms not only in the spring but again in early autumn.

If you are the fortunate possessor of a greenhouse, be it ever so small, the growing season need not end with the falling of the leaves. There are many varieties of perennials that may be started now and sizeable plants produced to bloom this year. Many shrubs and evergreens can be grown from cuttings. Annuals can be started early under glass and brought along in pots, thus getting a much earlier start.

If you have no greenhouse, a hot bed will help materially. The electric heating units with their thermostat control have eliminated the manure problem. As now recommended, the heating cable can be laid right on the top of the soil. This is much the simplest way and has proven the most efficient.

Seeds left over from last year should be carefully tested in planning your seed purchases. Count out a definite number and place them between two sheets of wet blotter in a dish that may be covered with glass. Give gentle heat and check carefully the percentage of germination. Some varieties hold their ability to germinate very well while others fail quickly. So much of the success of your garden depends upon seeds that you will want to use dependable kinds only. And good seeds are not costly. Ten or fifteen cents for a package of seeds is one of the cheapest items of expense when you consider the time and effort put into the garden.

An Endurance Contest

By Lola A. St. John

Glancing up one afternoon I saw a very queer looking object in the back yard some distance from the house. At first impression it looked more like a crooked stick with a large knob on the end, then I noticed it moved a little bit; upon closer investigation it proved to be a garter snake holding the head of a full grown toad in its mouth. The snake was trying to swallow the toad and the latter was trying to keep from being swallowed by sucking in all the air its body would hold. The question seemed to be which would get discouraged and give up first. It did not seem possible for the snake to swallow anything as large as that toad, but I did not want to take a chance on losing a good garden helper; so I laid a stick across the snake's body, pressing down gently on the stick until the snake was choked into letting loose its hold on the toad, which hopped away in one direction while the snake glided off in the opposite direction.

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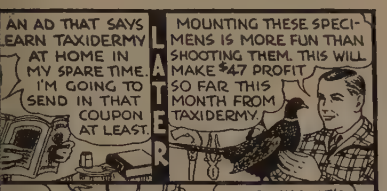
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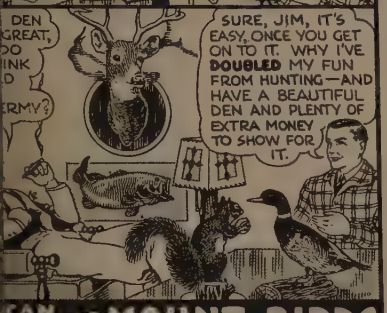
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A Zoo Screech Owl

By Malcolm Davis

This is the true tale of a screech owl, a story small as the bird itself, yet possessing a behaviorism seldom encountered in the birds of prey. The National Zoological Park in Washington displays a small cage of four screech owls. One can view them as they sit motionless in their small house. A gray phase bird of this group proved to be unusually active. In the evening the small tufted raptor would, in a manner known only to himself, work his way through the wire netting and escape into the nearby woods. At dawn the bird would return "home" and take his favorite perch within the house. One morning with difficulty I discovered him perched on a limb near the trunk of a small maple tree about three feet from his cage mates. His protective coloration pattern served him well, for it was some time before he was located. Returning a little behind time, the daylight probably overtook him, and he had camped nearby his abode. Or was the hunt good to him, and did his stomach contain many mice, making it impossible to squeeze through the netting?

Swimming Squirrels

By Harrison H. Fryette

Yes, squirrels do swim lakes, at least the little red pine squirrel of northern Wisconsin does. We spent the summer of 1914 on Mercer Lake, Wisconsin. We had been there other years but seldom saw a red pine squirrel. This year, however, quite a large tract of virgin pine up on the Flambeau was being cut and our region that was cut over became thickly populated with these squirrels. They scattered east and south of

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their thickly wooded home that was now destroyed and in so doing were often seen swimming the lakes of that region.

Many of them, however, never arrived at the opposite shore, for these are the lakes of Wisconsin that are famous for their muskies, and it seemed that pine squirrels were the muskies' favored dish. In fact, the muskies became so fond of squirrels as a diet that an Indian guide over on Big Squirrel Lake trapped squirrels for musky bait and guaranteed a musky in two hours at the fixed price of $25.00. This was a temptation to many busy Chicago business men who wanted to be sure to get a musky instead of doing as I did—work three years for one with an ordinary bait.

This guide proceeded as follows: He took Mr. Squirrel and rowed to a musky "hangout", hooked the squirrel through the back, and dropped him over. The squirrel naturally swam towards shore, and the boat stayed out in deep water, for a musky always runs for deep water when he is hooked. When the squirrel reached the region of the musky "hangout", he was given no more line. So he kept paddling around until the musky saw him and then it was curtains for Mr. Squirrel.

This always seemed like a very cruel and unsportsmanlike manner of fishing but if the squirrels had kept out of the water in the first place, the muskies could never have known how good they were to eat.

Wood-nymph Visitor

"I was quite thrilled a day or two ago," writes Annette Fiske of Pepperell, Mass., "by a visit I had from a wood-nymph. As I was reclining in my hammock reading, she came fluttering by and alighted on my dress, then on my bare elbow, and when I offered her my hand, she lit on that, flicking her wings with their gay bands, on which the centers of the eye-spots looked like tiny pearls. When she had fluttered off, I went inside and brought out a little sugar in the hope of attracting her to my table, but she did not notice it; so, as she was still fluttering about—it seemed as if she could not make up her mind to go—I put a little sugar on my hand and offered it to her. She perched on my hand but did not get the sugar and an attempt to introduce her to that on the table apparently scared her off. Later on I thought she had returned, but it was a larger butterfly I saw, of much the same color but without the bright bands so far as I had a chance to observe. He lit near me on the floor and I liked to think that he rolled his eye at me and decided I did not come up to what he had been led to expect. At any rate in a few minutes he turned his back on me and sailed away."

"Great Men of Science"

Great Men of Science, A History of Scientific Progress by Philipp Lenard comprises a brief résumé of the biographies and outstanding achievements of sixty-five famous scientists of many nationalities, each of whom has made a contribution of major importance to science. The period covered ranges over some twenty-five hundred years from Pythagoras of Samos to Frederich Hasenohrl. These data are presented by the author as parts of one organic whole, not simply as mere isolated records of the past. Among the scientists discussed are s characters as Euclid, Archimedes, Co nicus, Kepler, Pascal, Descartes, Bo Roemer, Newton, Papin, Bradley, W Cavendish, Dalton, Oersted, Ampere, O Weber, Faraday, Helmholtz, Darwin, K vin, Maxwell, and Hertz. The various s dies, the fruitage of a lifetime of collecti are presented with an illuminating criticis a generous enthusiasm, and a vivid sympat which tend to emphasize in a particula effective way not only the personality, t the secret of the scientific greatness of t individual and the subject. Presented as dividuals and beset with the most diver conditions and problems, yet they are one in an unselfish urge for truth. The d tinguished author is a Rumford Medall of the Royal Society of London, was award the Franklin Medal for his research, a just recently has been Nobel Prize winn in physics. This book in its new transl tion is certain to attain to wide usefulnes and its reading is commended. The pu lishers are Macmillan and the price is $3.0

"Incubator Crickets"

By E. A. Darmer

In January I started several small plan in an aquarium "hot-house", and in abo two weeks, what was my surprise to fin that the hot-house had served as an inc bator for nine cricket eggs that had bee deposited in the soil unknown to me.

When first hatched these crickets were c a very light brown shade, and about on eighth of an inch in length, but in spite c their smallness, quite recognisable as tru crickets. In April they were about three

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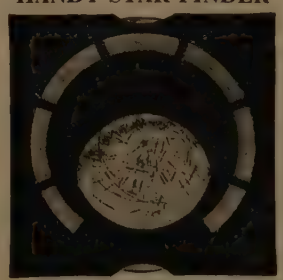

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quarters of an inch over all, including antennae. They seem to be perfectly healthy, and aside from whatever they find to eat in the soil, the only food they receive is a small particle of bread about twice a week.

It is interesting to watch these insects as they feel their way about. Often two will collide as they travel around the glass walls and at such times it appears that they telegraph messages with their antennae, one against the other. Finding them amusing, and as they add life to an otherwise uninteresting plant setting, it is my intention to keep them alive as long as possible, and although five of them died within a few days of hatching, the balance are expected to reach full growth. In the summer, after they have "paid their board" with a few musical chirps, I shall set them at liberty in the park, although they show no inclination to get out of the hot-house.

So far as I know, this is the only collection of live crickets in New York, although it is quite possible that others may have purchased plants having cricket eggs in the soil, but whether these hatched or not depends on whether the plants were placed in a hot enough place.

In Japan live crickets are kept somewhat after the fashion of keeping canaries and goldfish, and some of the containers are elaborately carved wooden boxes in various shapes and sizes. Some of the wealthier fanciers of *Gryllus neglectus*, as the cricket is called by naturalists, go to considerable expense in securing gold cages, silver and hollowed jade and colored soapstone also being used.

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THE DEFENDER

By C. C. Thompson

Thump, thump, thump. This strange sound came from the kitchen at frequent intervals in the morning while we were dressing and our curiosity led to investigation. Raising the kitchen window shade which had been drawn the night before, we looked and listened but found nothing unusual and the sound was heard no more that day.

The next two mornings brought the same strange sound but no discovery of its cause. Sunday morning then came and the thump, thump found us still in bed. The sound continued and we concluded the cause must be outside the window. Sunday morning leisure permitted a more careful investigation and cautiously peering through the dining room window our mystery was solved. There on a lower limb of a scrub oak tree near the kitchen window sat Mr. Robin, physically and mentally very much disturbed. We knew that Mrs. Robin covered their nest in a maple nearby.

Perhaps no creature ever fought with more courage in defense of home, for he fought against equal strength and courage—the intruder being his own image by reflection of a north window with green shade drawn inside. With appearance most savage he would dash against the window with full energy, "thump", then flutter back to the scrub oak limb. Thump, thump, thump, and perhaps no hero ever returned home with better tales of battles fought and won.

I doubt not that Mr. Robin returned each morning after just as courageous battle in defense of home, but the intruder was no longer there. In a spirit of kindness to our intimate friend, the green window shade was not left down.

A YUCCA IN DECEMBER

By Dudley L. Triggs

Last September thousands of acres brush and light timber land in the Santa Barbara National Forest were burned in one of California's worst fires. On Dec. while passing through the Sespe Game Refuge on the southern boundary of forest, I passed through several miles this burned area. A cloudburst, striking same territory soon after the fire, had swe the ashes and surface dirt down into canyons where it settled to a depth of or six feet. The Sespe River, one of C ifornia's best trout streams, ran sixty-sev per cent mud, killing all the fish and p luting the local water supply for seve weeks.

In all, a more barren landscape wo be hard to imagine. Yet among the ha burned twisted branches of the chapar the fire-blackened rocks and the mud-cak canyons, there was one startling bit color. A Yucca, bravely ignoring the de tution about it and as though determi to dispel the bleakness, was blossoming months ahead of spring. The heat of fire, though it had burned the Spanish B onets that protect the bulb within, just been sufficient to start the stalk. fall winds blowing over the mounta from the Mohave Desert had furthered growth and brought out the blossoms. W I came upon it there in the burn, it st fully six feet tall and was in full crea white blossom, seeming, indeed, a verita "Candle of the Lord."

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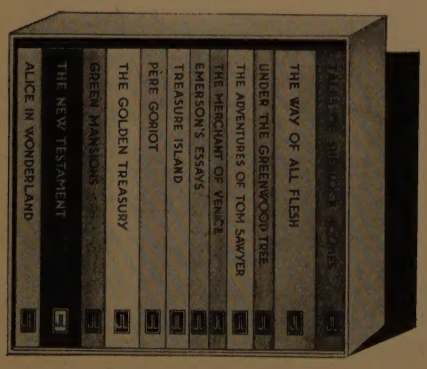

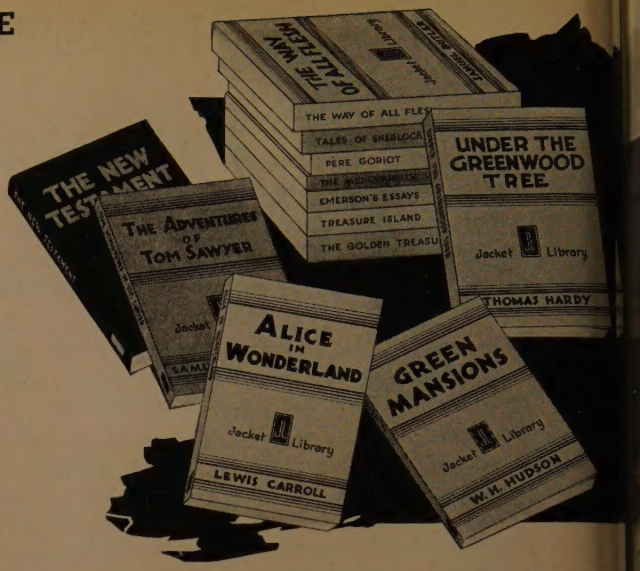

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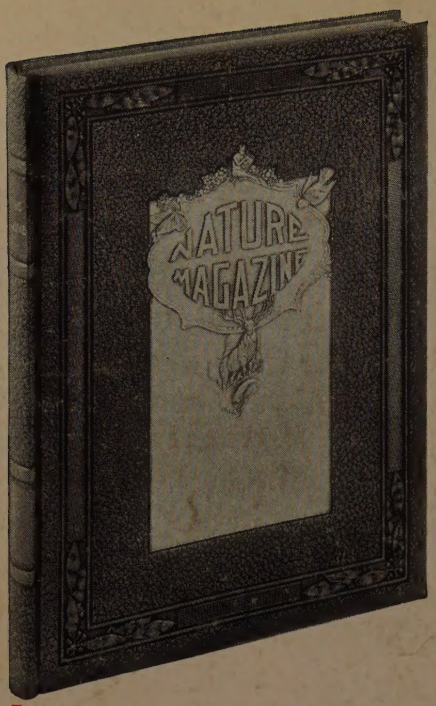

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